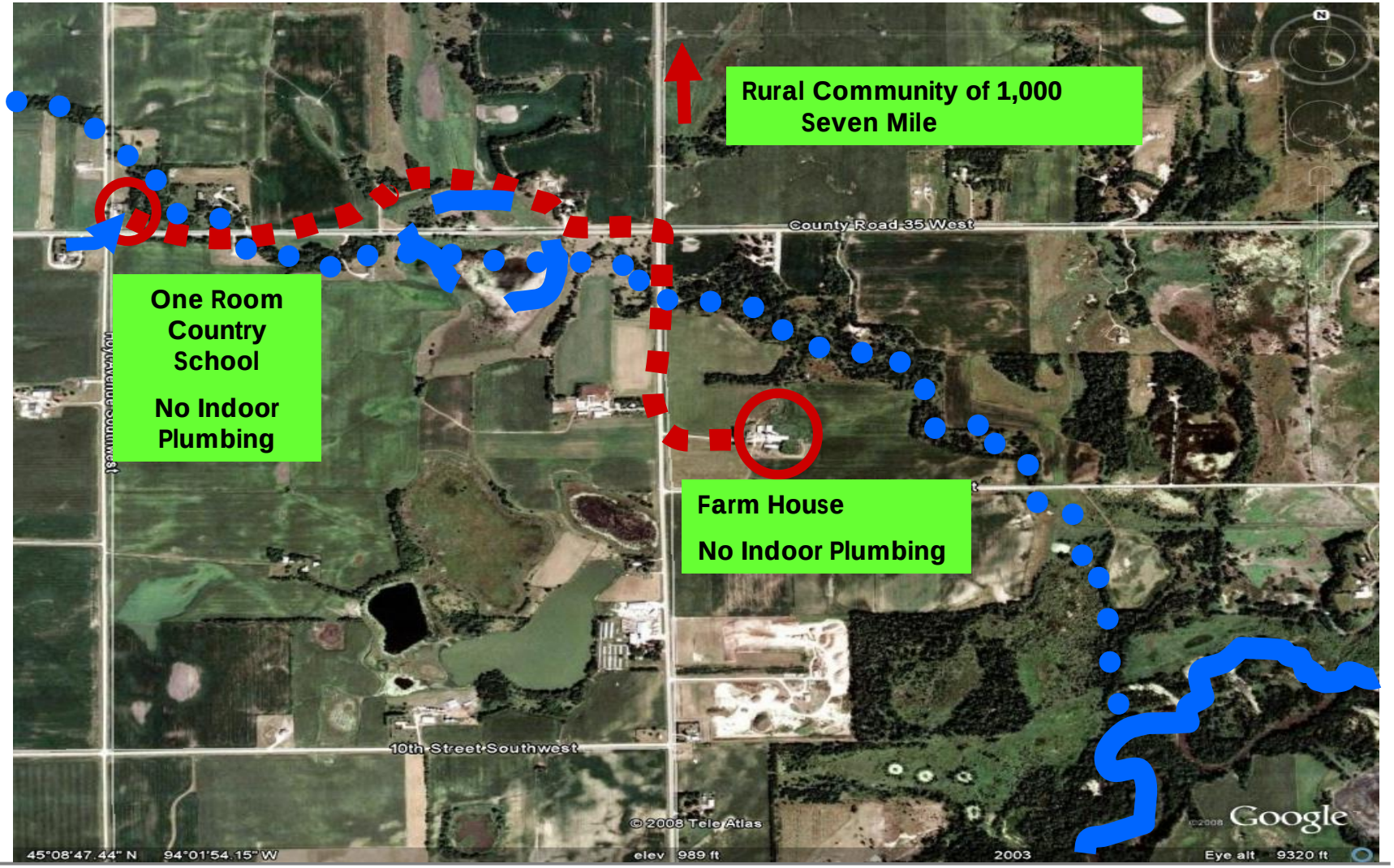
America's Pathway

To Sustainable Water and Wastewater Services

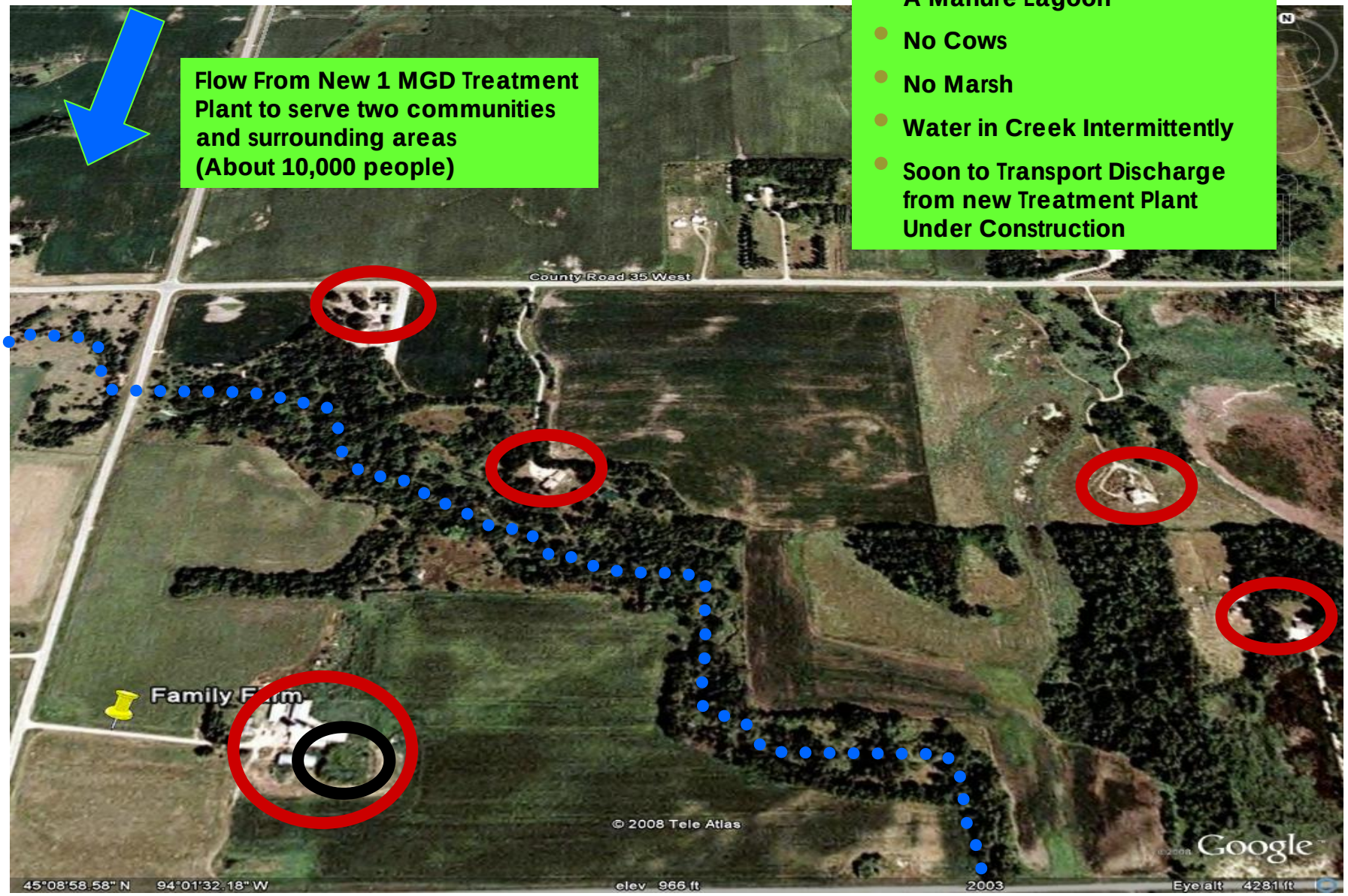
This presentation

- The Role Water Assets Have Played In Improving Quality of Life.
- The Context Of The Current Service Challenge in the United States.
  - The Character of Water Assets
  - Where The Resources Come From.
  - The Organizational Structure of Service Providers.
  - The Demographic Underpinnings.
  - A Generation of Expansion and Upgrade.
- The Gap Analysis & The Needs Survey
  - Growth in the Economy and Population.
  - The Implications of Aging Assets.
  - Compare & Contrast.
- Exploring A Period of Change - - Recognizing and Pursuing Opportunities.
- Video and website tools.

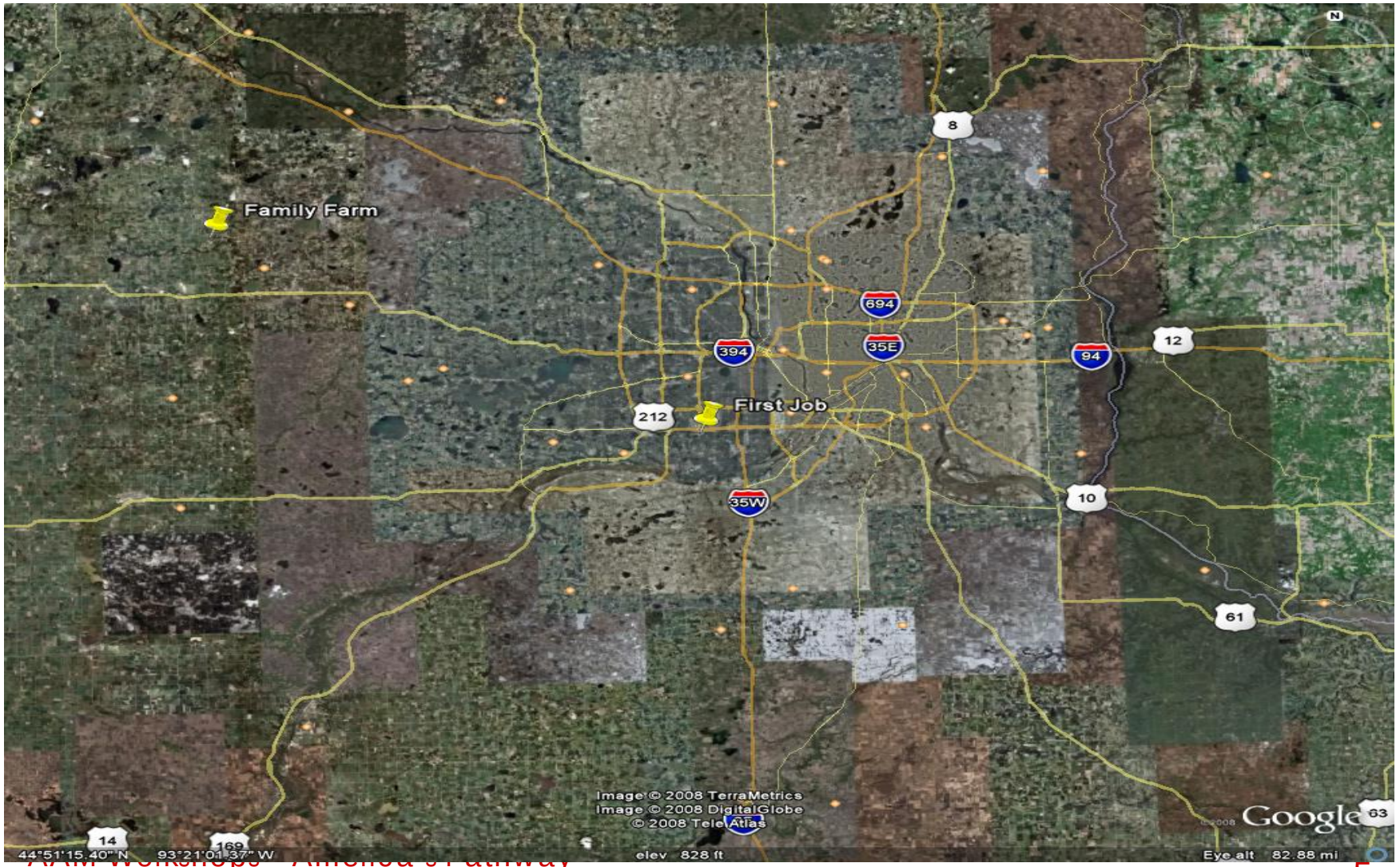
The family farm (My universe - [1946-1964])



The family farm (2008)

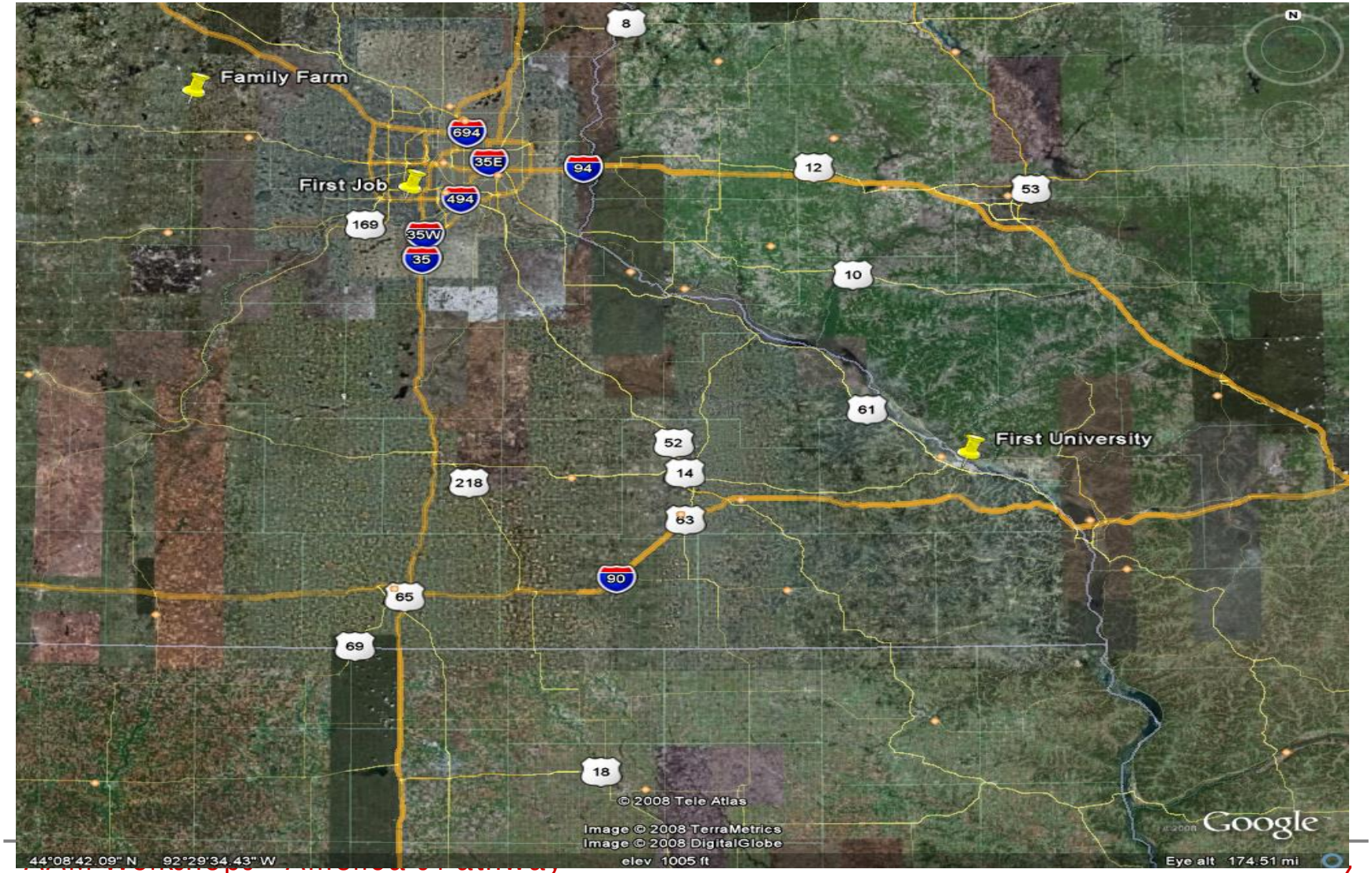


My universe grew: First Job – Laying sewer and water lines in pasture land. Urban fringe of Metro Area (1964)

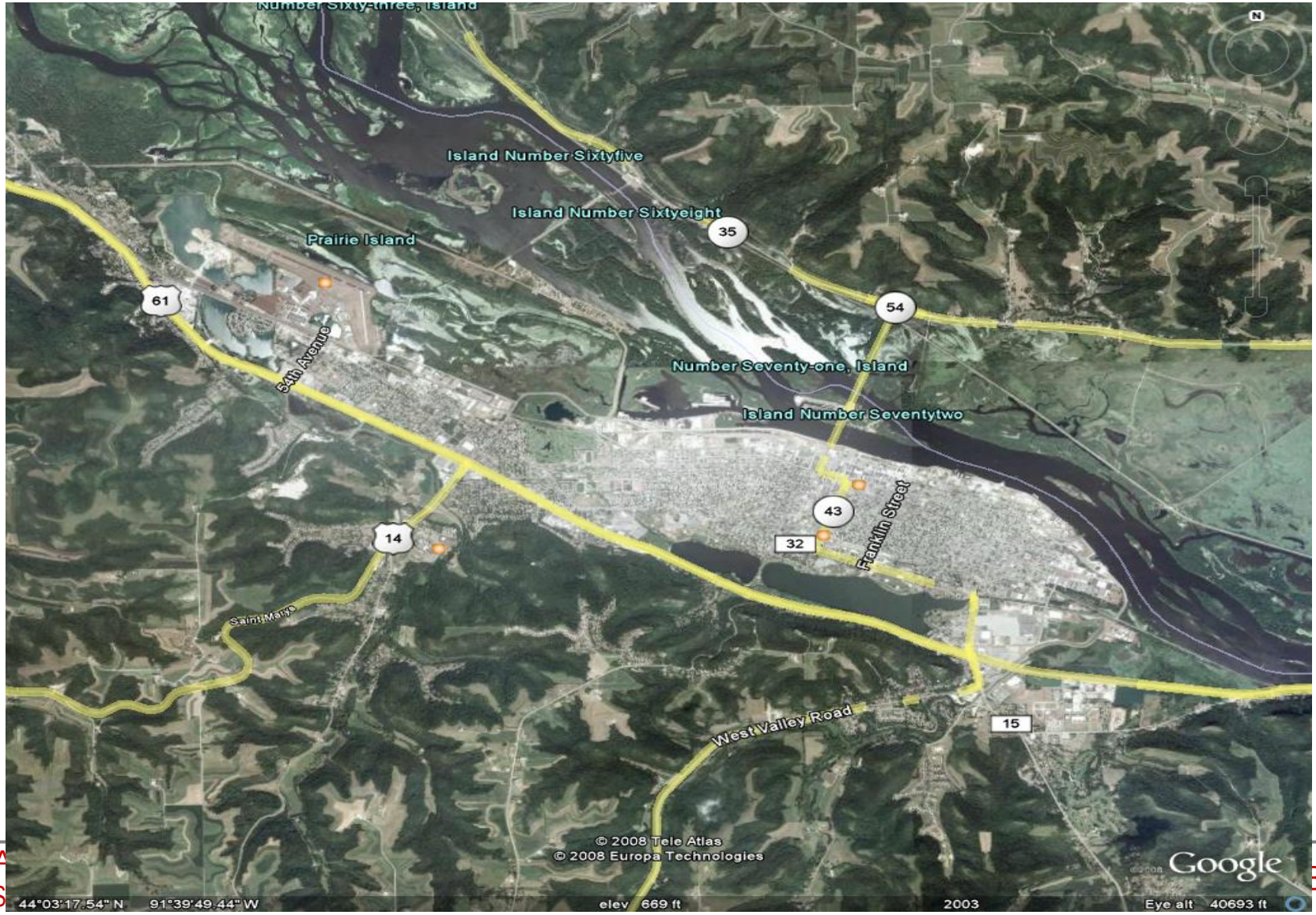


Current land use at site of my first pipe laying job.

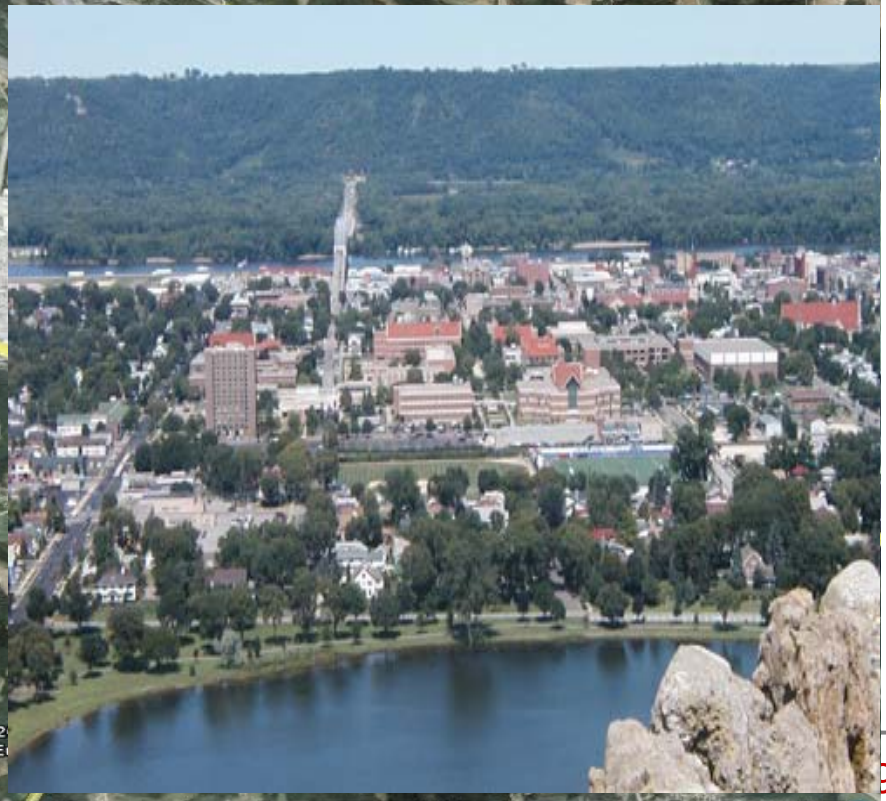
My universe grew a bit more: First university town fall of 1964

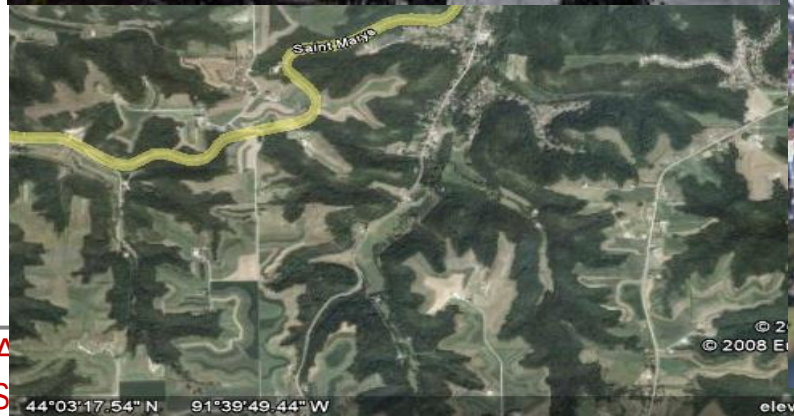


A college river town of 25,000



River towns can be ecologically magnificent





The river, which is the dominate feature can also wreck havoc: The 1965 flood was a record, it continues to happen (2001 & 2007)

I became involved in the community. My viewpoint as to what's important is still the same. The difference in thinking is about the "How To" approach to confronting this challenge.

WSC senate head files for mayor

The president of the Winona State College student senate, Steve Allbee, Tuesday afternoon entered the race for mayor in the Dec. 7 general city election.

Allbee, 24, a native of Maple Lake, has been a resident of Winona for about 2½ years since his separation from the Marine Corps.

He's a senior at Winona State majoring in political science.

HE'S A MEMBER of Leon J. Wetzel Post 9 of the American Legion here, past president of the Veterans Club on the Winona State campus and a member of the Political Science Club at the college.

He enrolled at Winona State in 1964, left college to enter the Marine Corps, spent 2½ years in combat duty in Vietnam as a Marine sergeant and has toured extensively throughout the Far East during and after his tour of duty in the service.

He lives at the Red Top Trailer Court.

Allbee last year was master of ceremonies at the Minnesota Collegiate Veterans convention in Winona and was organizer of the Earth Day program here last spring. He's a member of the Winona Area Environmental Committee.

AFTER FILING for the office of mayor, Allbee said:

"The primary issues of this campaign will center on retention of the present form of city-manager government, Winona's need for adequate public transportation and correction of the safety hazards posed at railroad crossings.

Steve Allbee

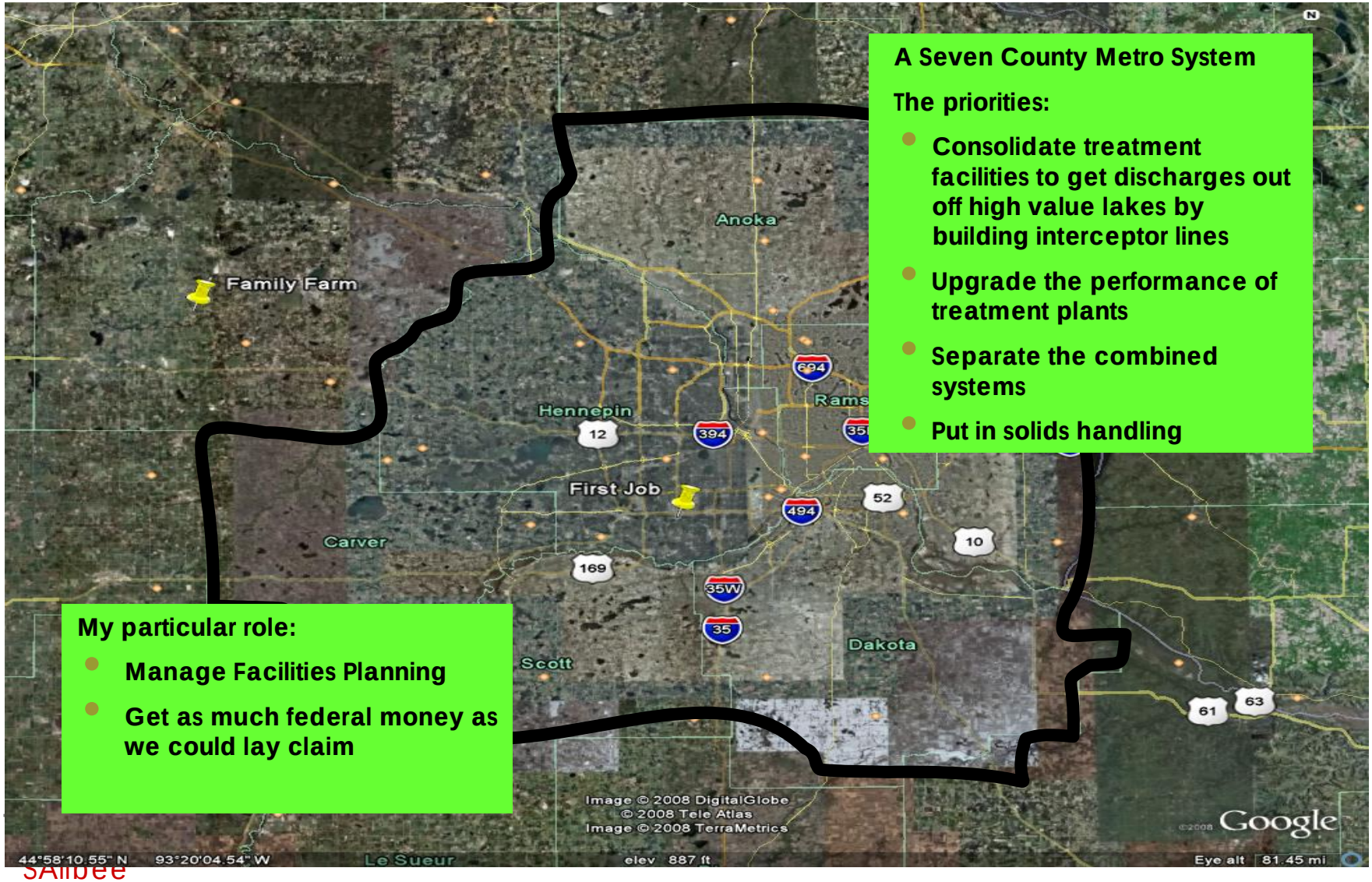
"Planning Commission meetings this past summer concentrated on interest in retaining the natural beauty of the Winona area. Controlling pollution and protecting our environment is a responsibility of all of us. I feel growth and development need not be contained by an emphasis on ecology, rather it can stimulate and encourage change.

"I believe it is time for the young people of Winona to share in the direction of their city's future."

"Controlling pollution and protecting our environment is a responsibility of all of us. I feel growth and development need not be contained by an emphasis on ecology, rather it can stimulate and encourage change"

Fall 1971

On to Graduate School and then my first professional job



A Seven County Metro System

The priorities:

- **Consolidate treatment facilities to get discharges out off high value lakes by building interceptor lines**
- **Upgrade the performance of treatment plants**
- **Separate the combined systems**
- **Put in solids handling**

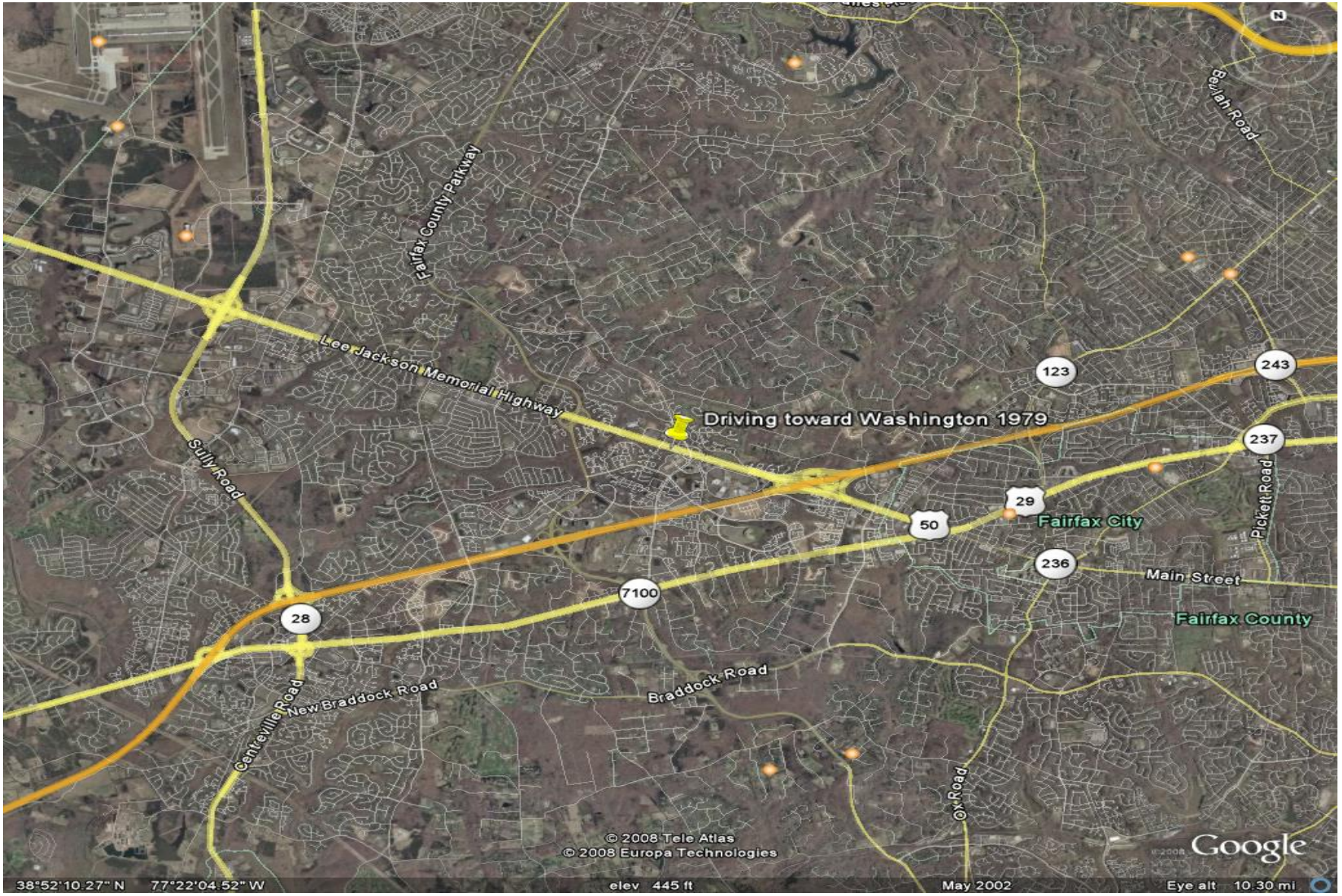
My particular role:

- **Manage Facilities Planning**
- **Get as much federal money as we could lay claim**

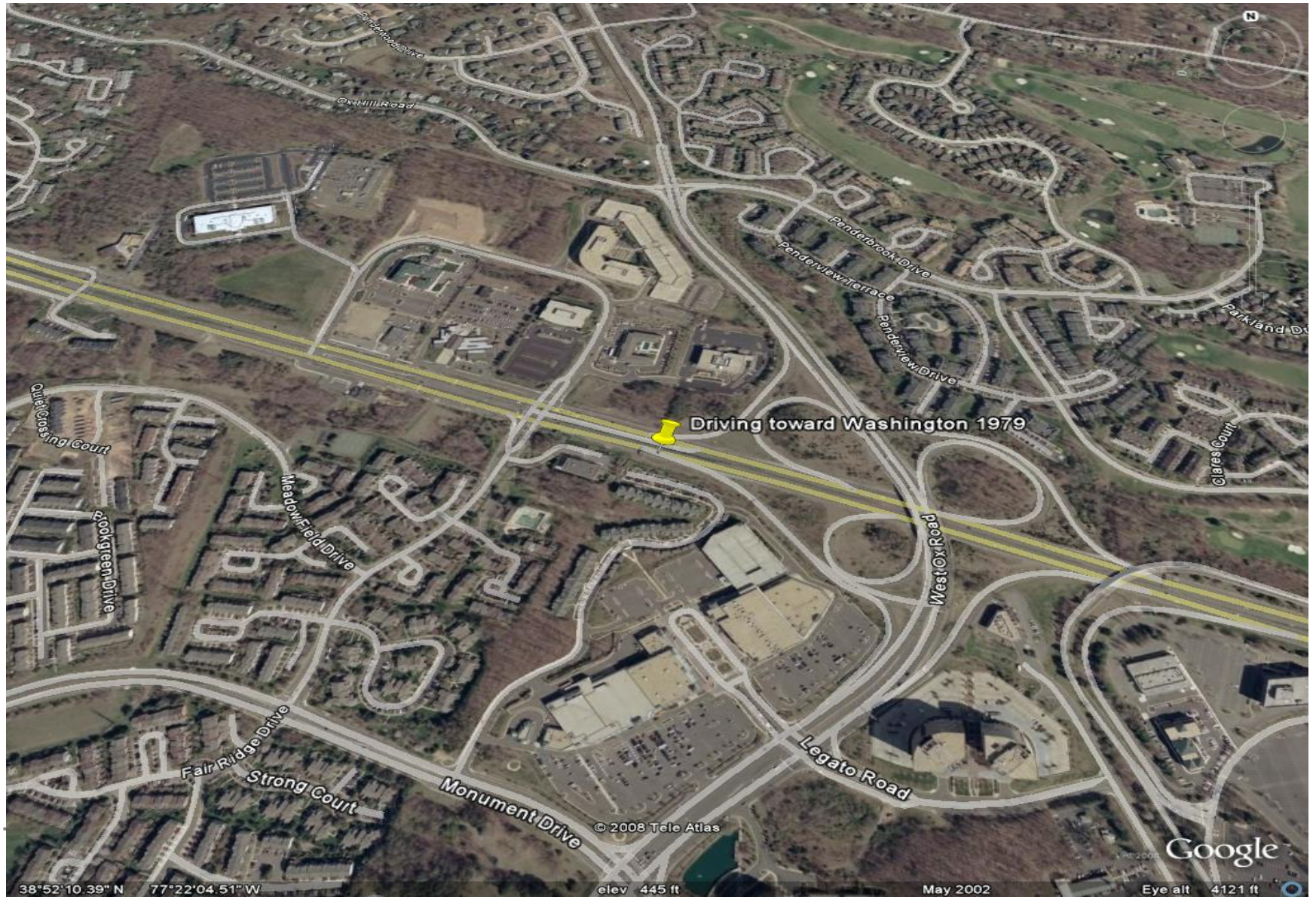
An urban area that what was seven counties is now twelve (the change between 1970 – 2000)

Census Population		Change, 1990 to 2000		
April 1, 2000	**Number**	**Number**	**Percent**	
Minneapolis--St. Paul MSA	2,968,806	2,538,834	429,972	16.9%
--Anoka County	298,084	243,641	54,443	22.3%
--Carver County	70,205	47,915	22,290	46.5%
--Chisago County	41,101	30,521	10,580	34.7%
--Dakota County	355,904	275,227	80,677	29.3%
--Hennepin County	1,116,200	1,032,431	83,769	8.1%
--Isanti County	31,287	25,921	5,366	20.7%
--Ramsey County	511,035	485,765	25,270	5.2%
--Scott County	89,498	57,846	31,652	54.7%
--Sherburne County	64,417	41,945	22,472	53.6%
--Washington County	201,130	145,896	55,234	37.9%
--Wright County	89,986	68,710	21,276	31.0%
--Pierce County, WI	36,804	32,765	4,039	12.3%

Moved to Washington D.C. (1979). The countryside was only 20 or so miles from downtown.



Today, the urban fringe is another 25 miles out



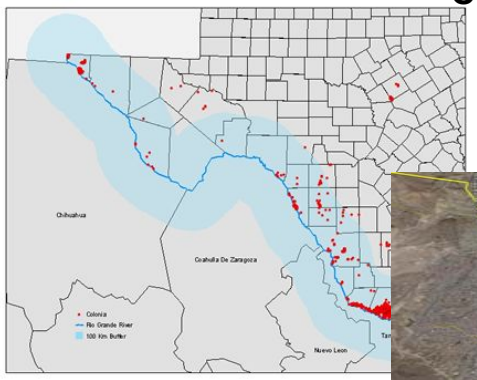
Since arriving at EPA in 1979, most of my work has been about managing and establishing financial assistance program for wastewater.

Construction Grants (CG)

The State Revolving Fund Program

Tribal and Alaskan Native Programs

Colonia Programs



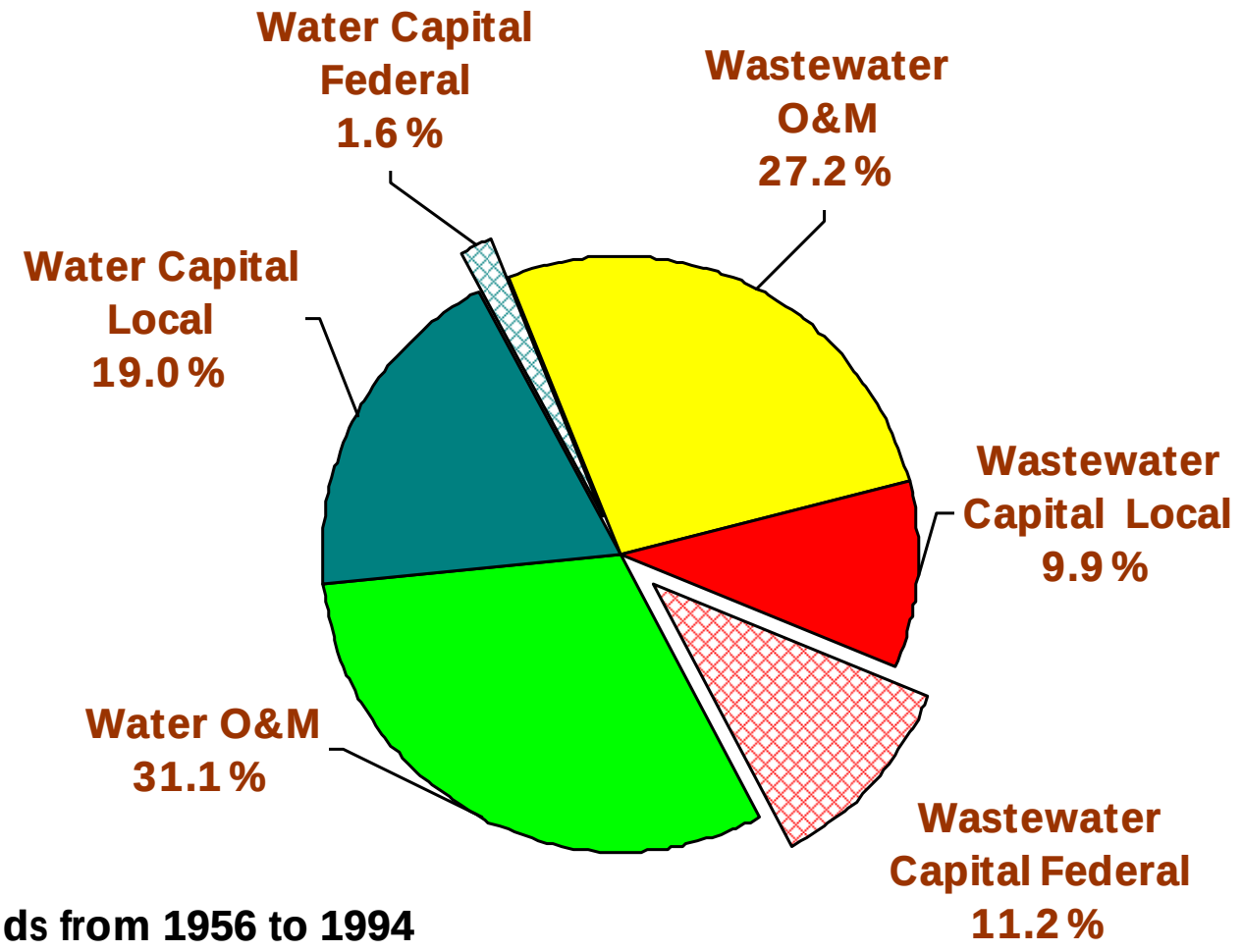
Border Programs

The challenge was to create federal programs that were responsive and effective in responding to particular needs

What I Have Concluded

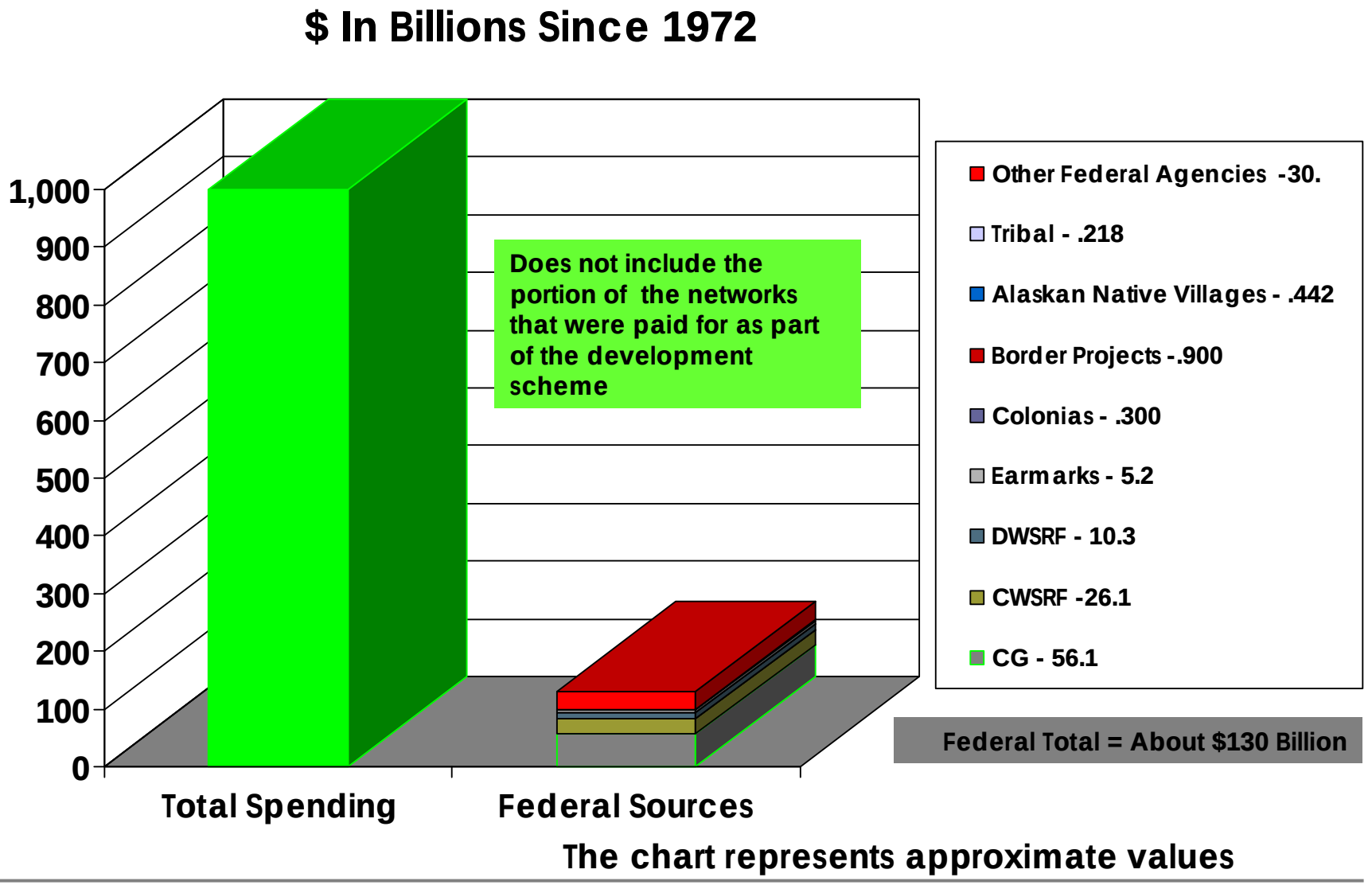
Federal financial assistance was extremely helpful in bringing about measurable benefits, but a sustainable approach demands coming to terms with changes that reach beyond Federal funding strategies or mechanisms.

The vast majority of resources have always been local and will continue to be local



Sources of funds from 1956 to 1994

Where is the opportunity?



Global Strategic Context

Sustainable water is an issue on the same order of magnitude as energy and climate change

These are
societal changing issues!

Local Strategic Context

"It's very, very difficult to run a first class country or city on second rate infrastructure"

LGAC Video

The leadership challenge – It's not easy!

- Successfully leading a community requires defining a forward looking sustainable pathway for both community wealth (Infrastructure) and natural assets.
- Significant financial commitments are necessary. Investment choices must reflect best value and respect intergenerational equity. Some investment choices will accrue benefits for generations.
- Defining a sustainable pathway is first and foremost a bottom up process that demands engaging the whole community.
- An effective collaborative processes requires a focus on education, research and the development and transfer of new knowledge.
- Federal and State policies need to be enabling, protective and precautionary and sometimes compulsion will come into play.
- The stresses are significant and business as usual will not produce a sustainable outcome. Innovative and experimental strategies are an essential aspect of meeting the challenge.
- A sustainable pathway isn't found through a series of quick fixes or deferrals. Fundamentally its about a new way of thinking and a rigorous process.

Moving From the Personal and Strategic Characterization to the Details

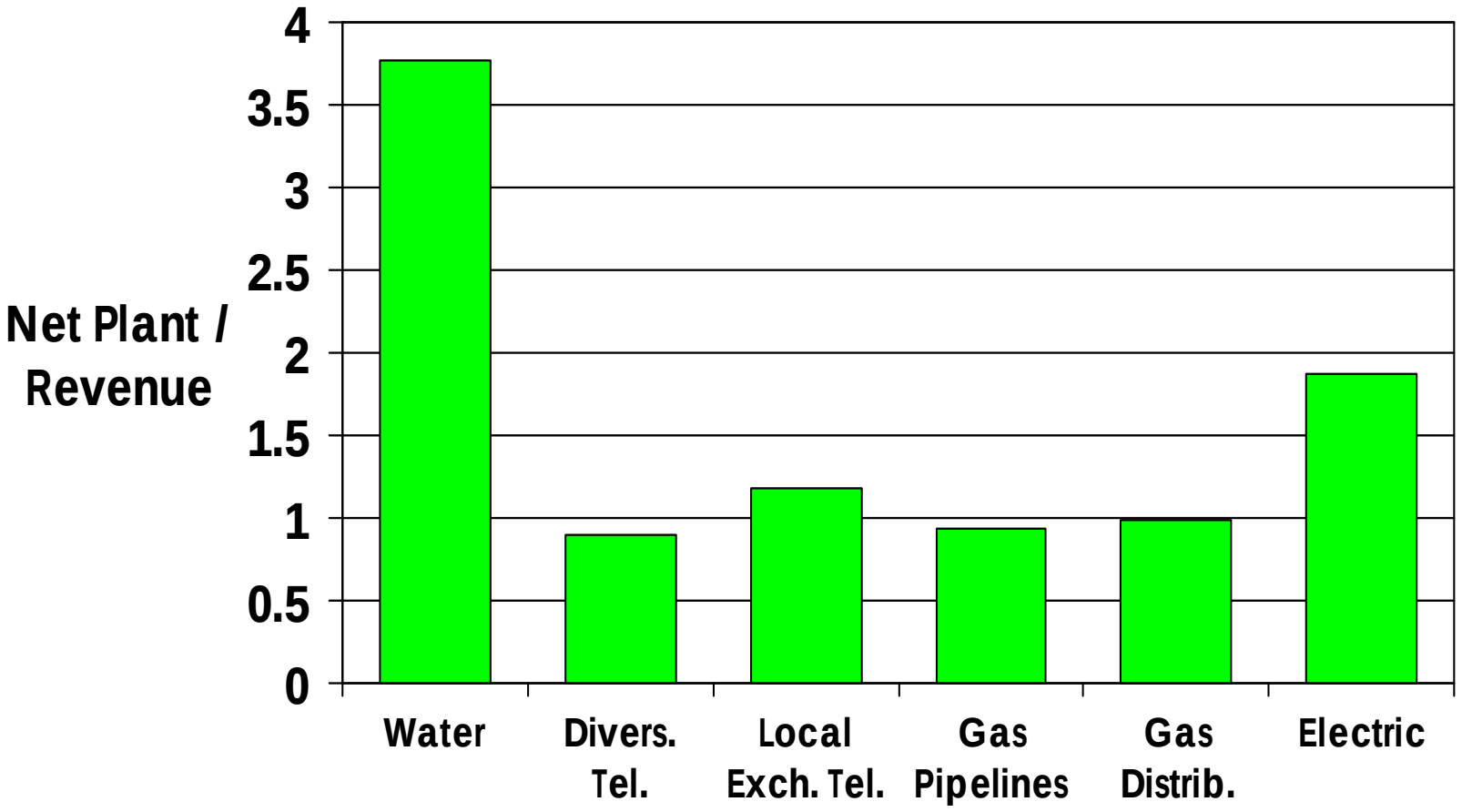
Water and Wastewater Infrastructure

Part of the fabric of modern living -- along with roads, transportation systems, energy and communications networks and other similar systems needed to deliver services

The basics of water related infrastructure

- Generally very large.
- The costs are usually “sunk”.
- Asset lives are long.
- The services are often major inputs into a wide range of other industries and activities.
- Frequently substantially impacted by other types of infrastructure decisions, especially choices about land use and the density of urban development.

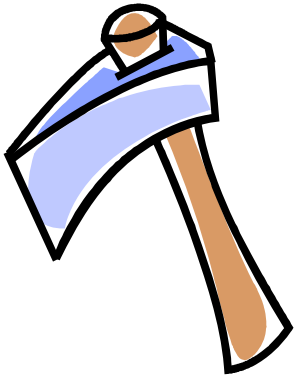
Water / wastewater systems are capital intensive



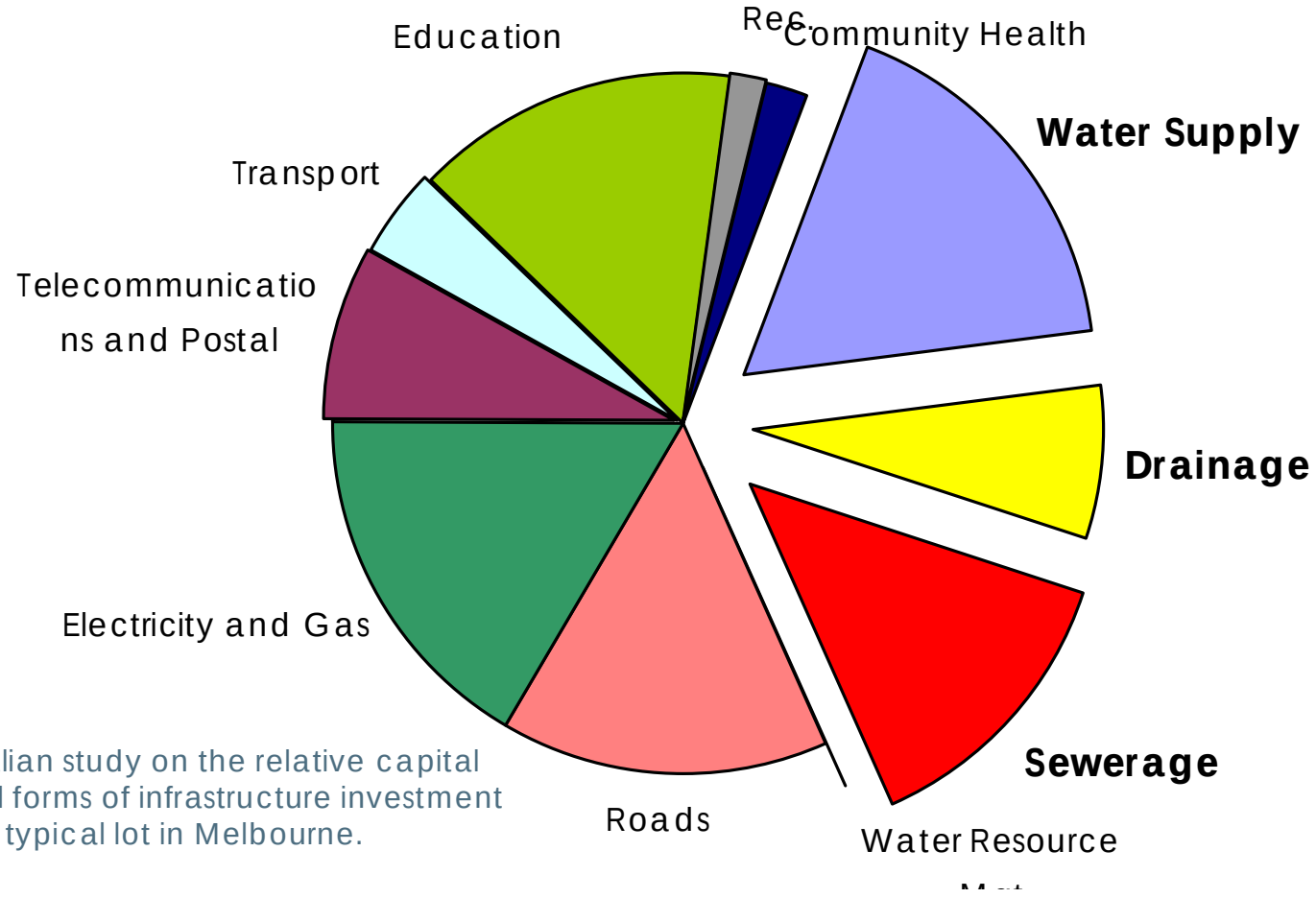
Purvenas, T.J., "Infrastructure Replacement – Credit Quality Concerns," *Water,* Spring 1998, National Association of Water Companies, Washington, D.C.

The characteristics of water infrastructure assets

- The systems are maintained in perpetuity (Grandfather's axe).
- Large networks are made up of components that are replaced, but network service potential remains constant.
- Don't actually (physically) depreciate on a straight line basis - that is, loss of service potential is not evenly distributed across time.



Water, sewerage and drainage (30 to 35%) of All Capital Investment in an urban lot



An Australian study on the relative capital costs of all forms of infrastructure investment to serve a typical lot in Melbourne.

The history of urbanization, environmental degradation, and a generation of investments in expansion and upgrade partially defines the current challenge

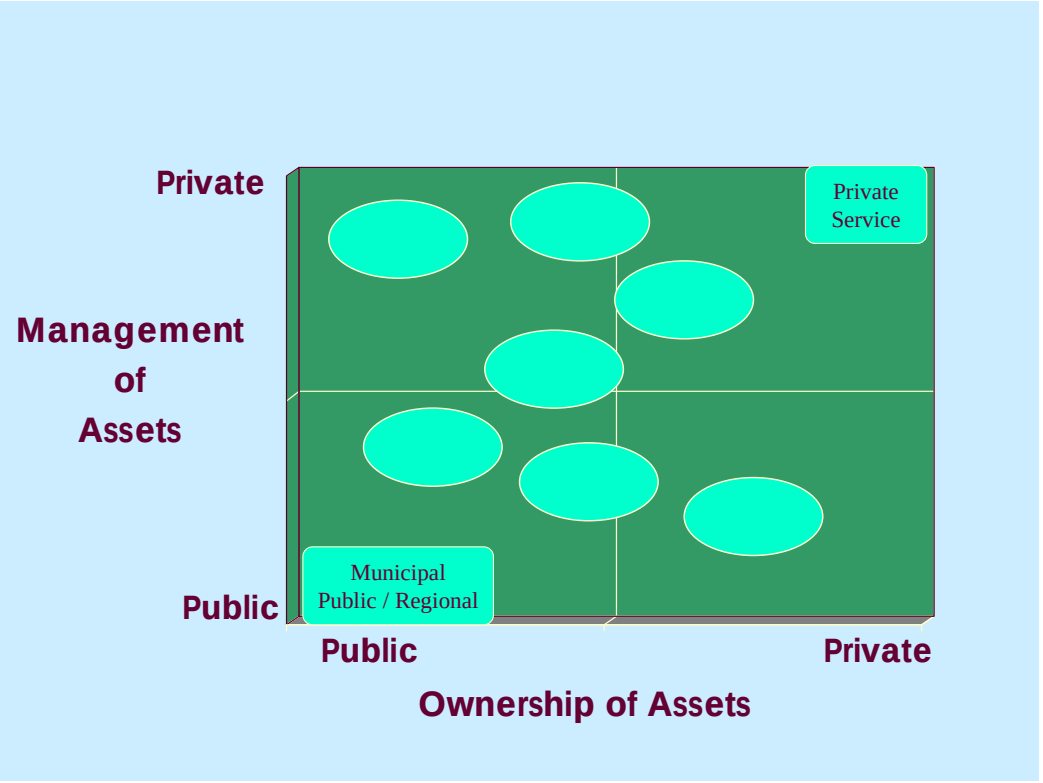
- In the 1970s, the country faced significant water quality problems and major policy and strategic changes resulted.
- The Federal government took on a larger role as a regulator and became a very significant source of funds for capital improvements.
- A new permit process was established to control discharges to the nation's waterways.
- Very large investments were made in the treatment of industrial waste and in the upgrading of the public wastewater systems.

Highly decentralize management

- There are 16,000 public owned wastewater systems serving 75% of the population through centralized systems
- There are 54,000 community based water systems serving about 94% of the population through centralized systems
- The remainder of the population is served by on-site systems and private wells
- Most of the systems are small or very small
- However, most of the population is served by a relatively few large systems

Every model of ownership and management

- Public Services
- Corporate
- Service and Leasing Contracts
- Concession Models
- Fully Private



Trends In Ownership and Management

- Institutional arrangements are trending more holistic. The organization's focus is broader (on the full water cycle). Decisions involve thinking from the point of source acquisition through initial treatment, distribution, collection, treatment and reuse or discharge. The broader framework affords opportunity to capture additional efficiencies and reduce adverse impacts.
- Steps are taken toward integration of centralized and decentralized service options. There is no one size fits all.
- Asset management at the strategic and tactical levels forms the underpinnings for making better investment decisions.
- In the leading edge, asset management practices are trending toward a multi-sector platform where key decisions and priorities are set in the broader context of multiple infrastructure requirements across several municipal service areas.

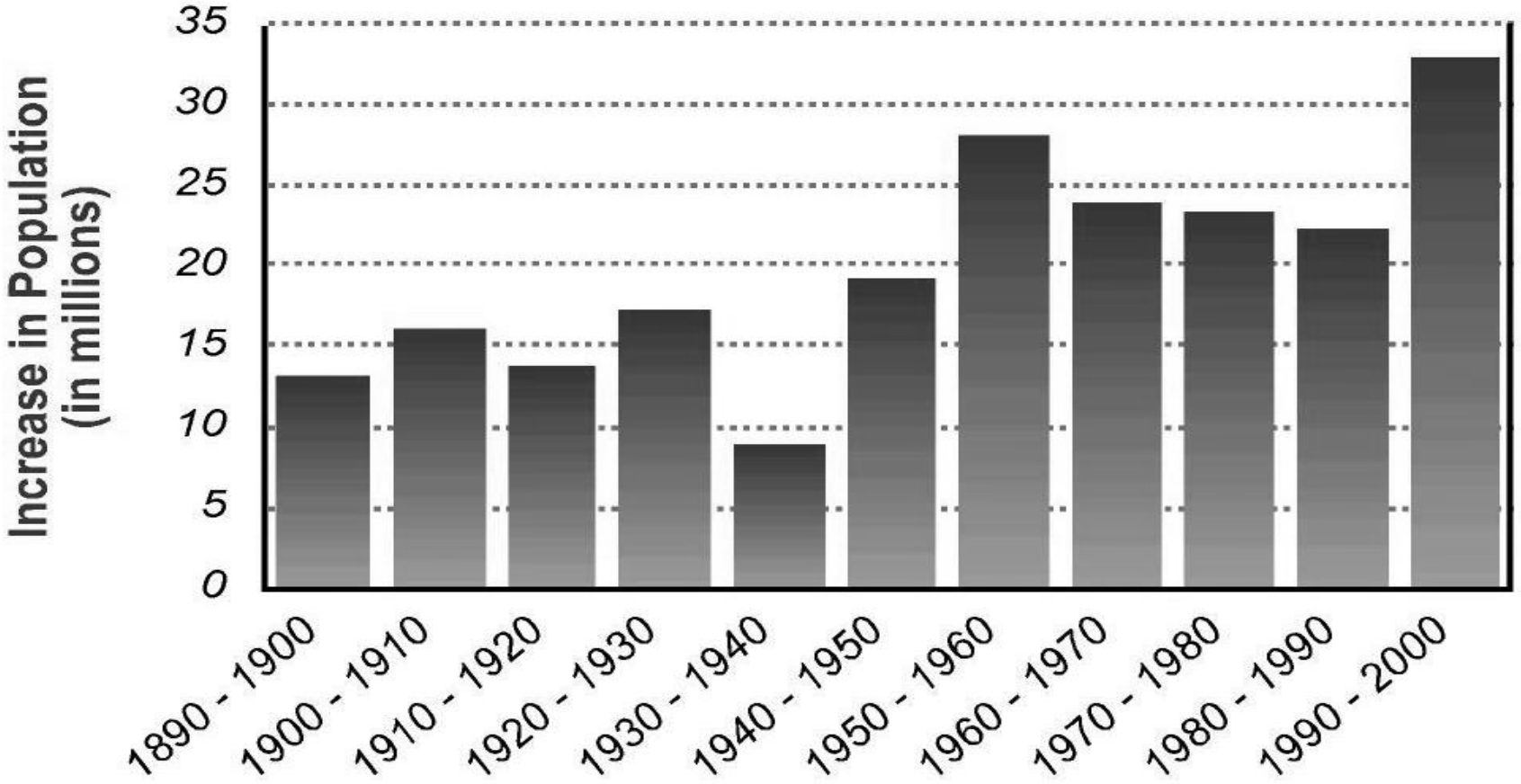
Trends In Ownership and Management (Continued)

- The purchase of good and services, which have been governed by a range of statues, laws, code and ordinances are being revisited to move the decision basis from first cost considerations to life cycle cost considerations (the value proposition).
- The service can be successfully provided in a public or private venue. In either case the emphasis is on becoming more business-like, more efficient and more customer oriented.
  - Partnership arrangements are increasing - To establish successful partnerships there needs to be clarity about the service and performance requirements and the project process.
  - Long term successful public private partnerships demand that both parties strengthen their understanding of the particulars of the relationship, contract mechanisms and dispute resolution tools.

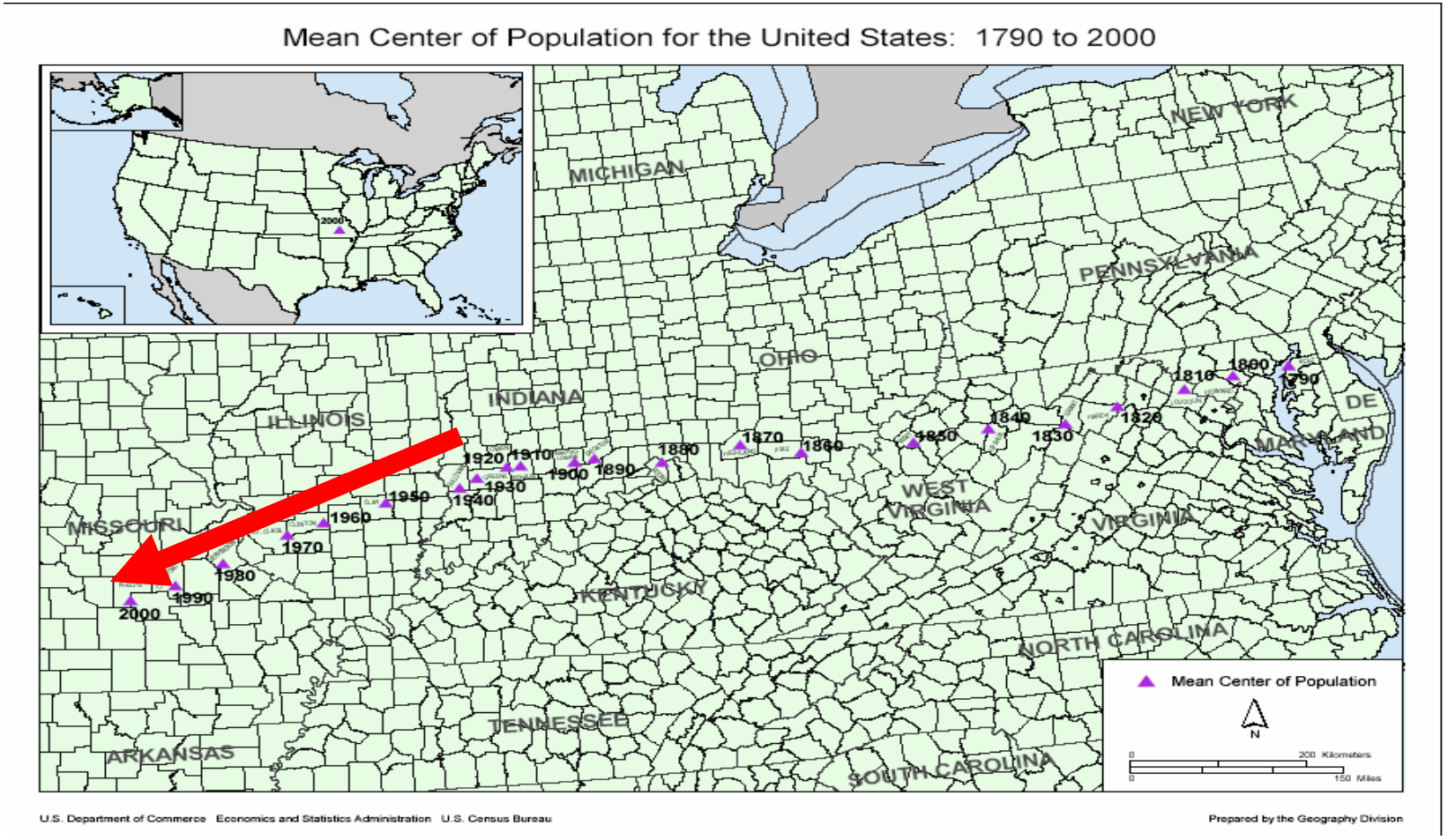
The Demographics of People and Systems Are Important!

Long Life Assets (Water Infrastructure) Are Highly Impacted By Growth Patterns and Long Term Demographic Shifts.

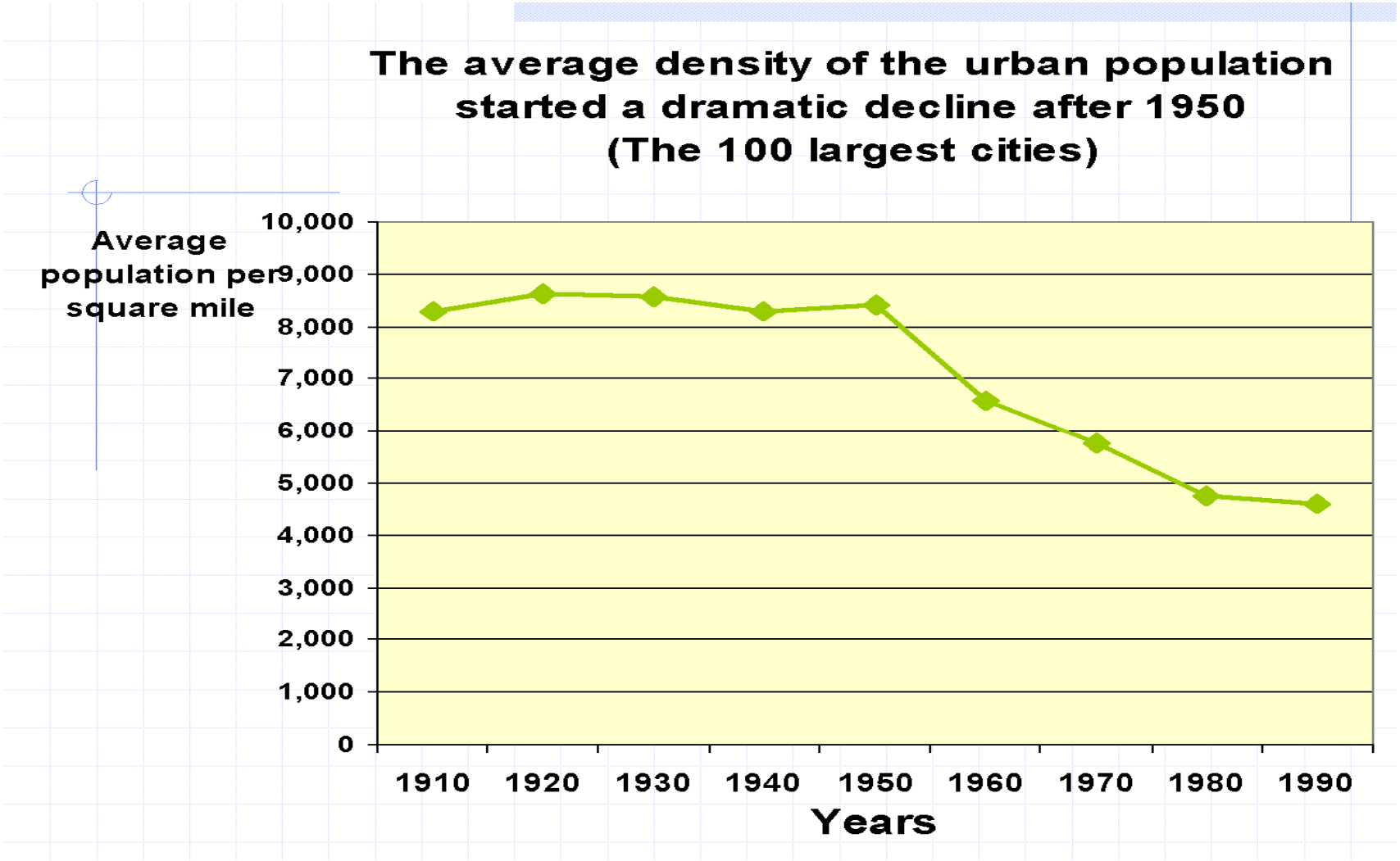
The nation's demographic pattern



Population shifts

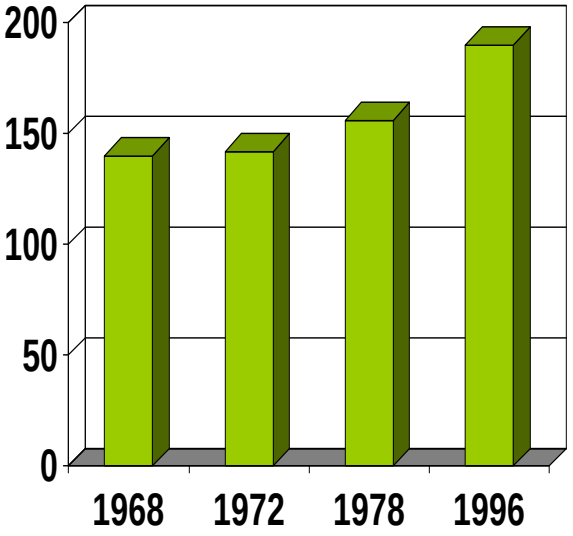


Changing patterns in land use density



Over the last several decades investments in expansion and upgrade

50 Million More Served

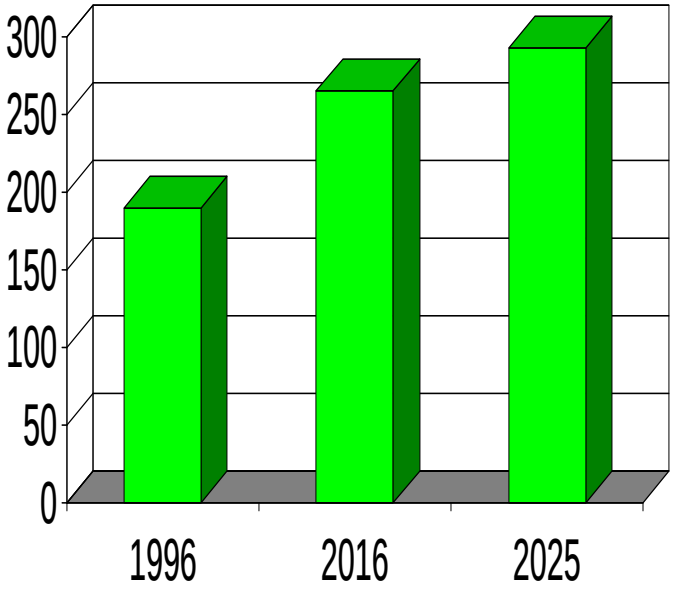


Source: USEPA, Progress in Water Quality. An Evaluation of the National Investment in Municipal Wastewater Treatment, June 2000.

Higher levels of treatment				
	72	82	92	96
Total Plants	19,355	15,662	15,613	16,024
Less Than Secondary	13.4%	19.9%	5.6%	1.1%
Secondary	48.7%	50.7%	58.2%	58.6%
More Than Secondary	2.4%	17.6%	23.6%	27.6%
No Discharge	2.4%	10.2%	12.7%	12.7%

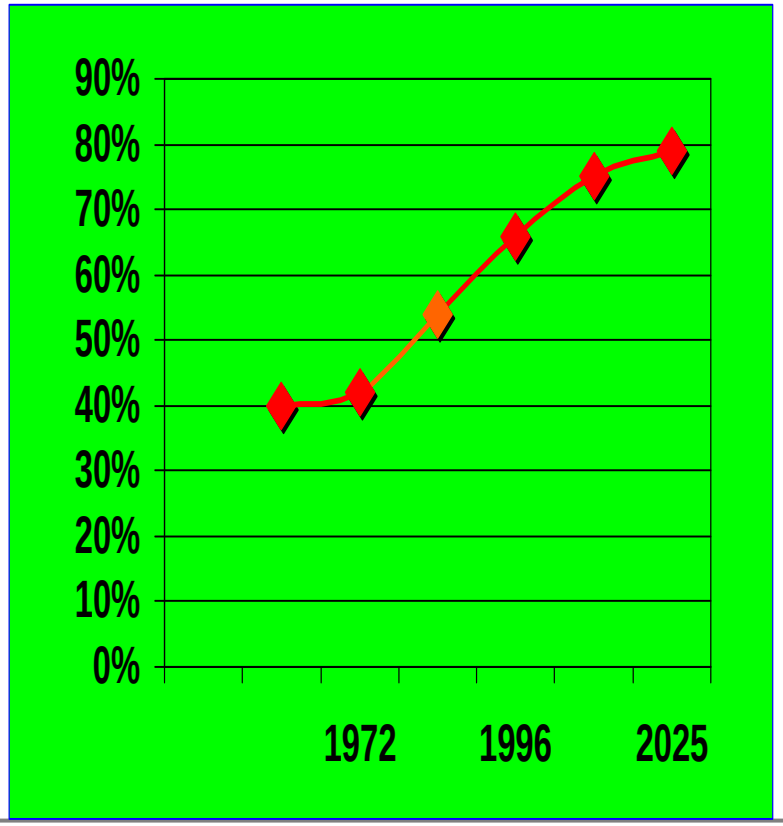
The emerging challenge

Additional Served Population1996 to 2025 (In Millions)

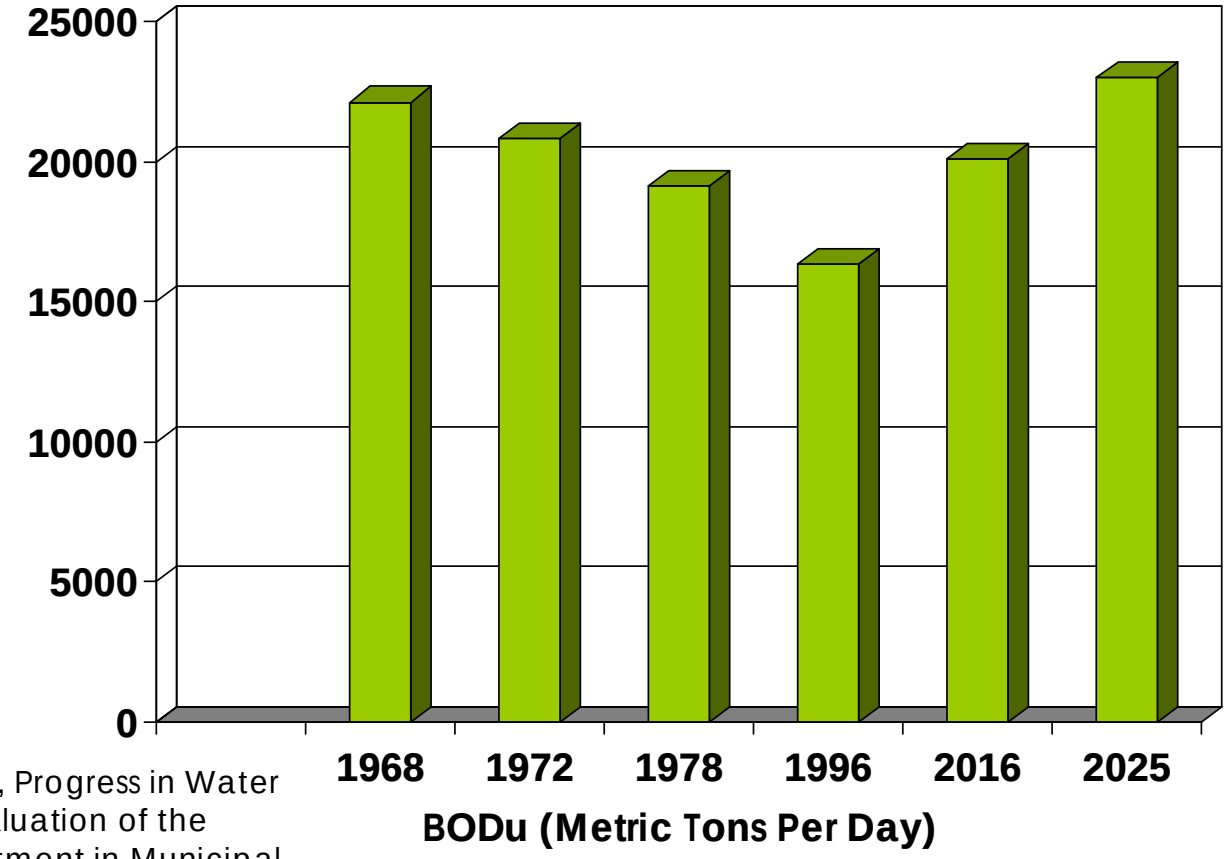


Source: USEPA, Progress in Water Quality: An Evaluation of the National Investment in Municipal Wastewater Treatment, June 2000.

Leveling Off of BOD_U Removal Efficiencies



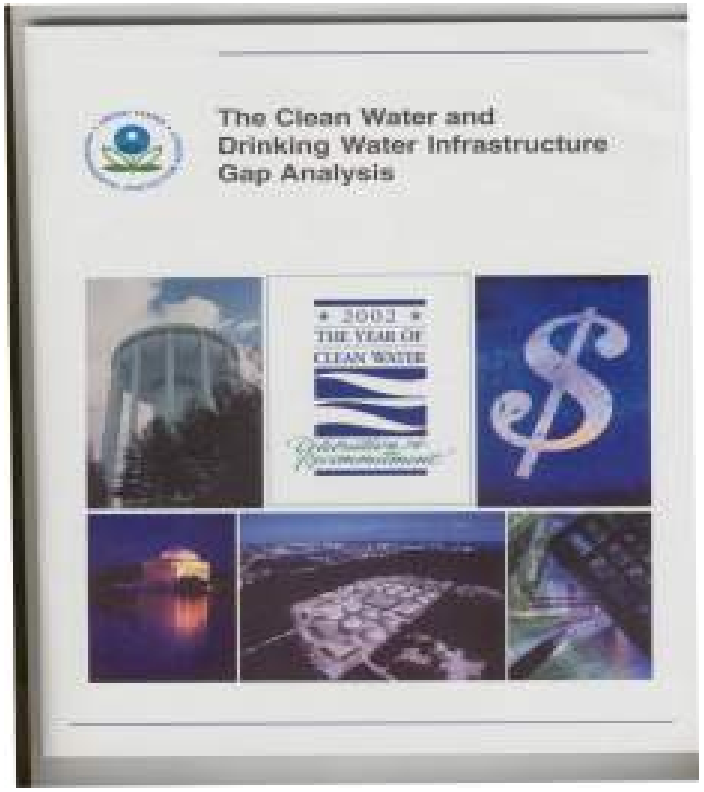
The projected growth alone, could produce BOD_U loadings similar to the mid-1970s



Source: USEPA, Progress in Water Quality: An Evaluation of the National Investment in Municipal Wastewater Treatment, June 2000.

A Gap Report provided a transparent starting point - -

- The Gap Report Was Released - - WEFTEC 2002.
- The Purpose -- To reach a common quantitative understanding of the (Funding Gap) the potential magnitude of increase in investment needed to:
  - Address growing population and economic needs, and
  - Renew our existing aging infrastructure.



http://www.epa.gov/owm/gapreport.pdf

The Findings (2000-2019)

No Revenue Growth Scenario

Total Payment Gap (20 Years) (Average in Billions of Dollars)		
	Clean Water	Drinking Water
Capital	**$122**	**$102**
O&M	**$148**	**$161**
Total	**$271**	**$263**

Revenue Growth Scenario

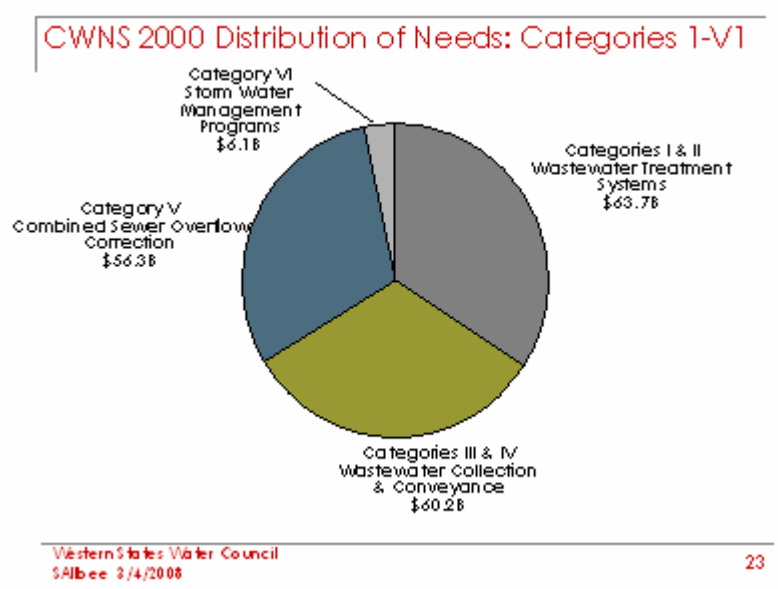
Total Payment Gap (20 Years) (Average in Billions of Dollars)		
	Clean Water	Drinking Water
Capital	**$21**	$45
O&M	**$10**	**$0**
Total	**$31**	**$45**

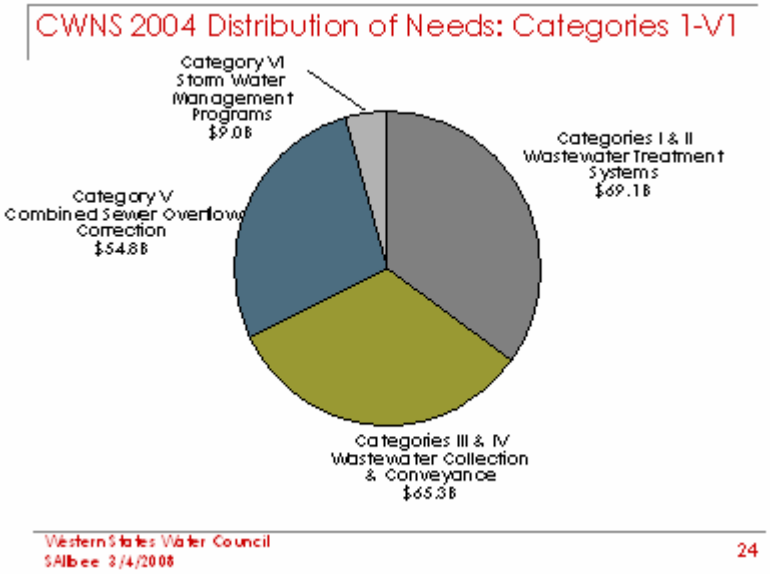
(Annual Rate of Increase - 3% Real)

The Analysis

- Does not predict fate - - it identifies the challenge.
- Once the situation is understood, steps can be taken to do something about getting somewhere else.
- Identifying the elements of the challenge allows resources to be used where it counts most.
- Early understanding provides time to take steps to mitigate adverse outcomes and reach consensus on a pathway forward.

Comparison 2000 vs. 2004





- Overall an increase of $16.1B (8.6%)
  - Categories 1- V: $189.2 B (An increase of $9B over 2000)
  - Category VI - Stormwater: $9.0B (An increase of $2.9B over 2000
- Additional data available on non-point source & Recycled Water Distribution
- Substantial changes in presentation and user value planned for the next survey

This is not a "*All Broke Crisis*" but, on the way to a persistent systemic problem

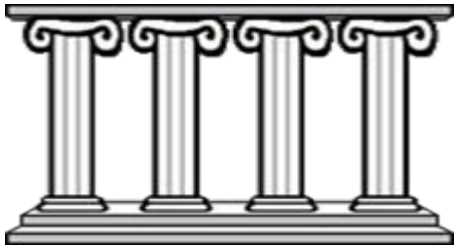
- Our systems are aging.
- The status quo will result in increased public health and environment risk.
- Failure to manage the assets based on least life cycle costs strategies will require more revenues over the long term to meet service objectives.

We can document that placing an emphasis on tackling the problems produced results, however !

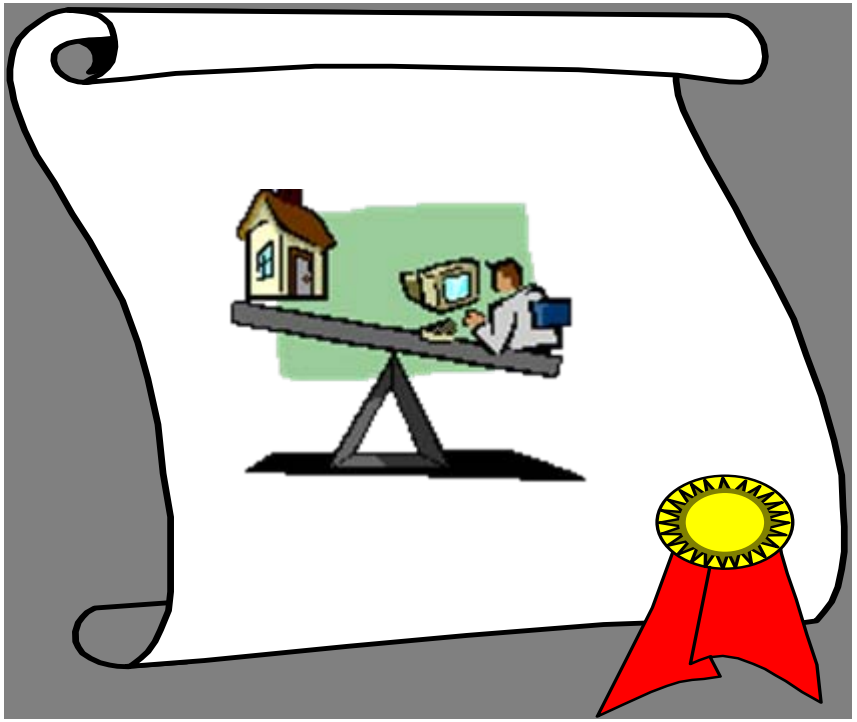
- Infrastructure challenges are not addressed through a one time fix, but rather a sustained commitment.
- The emerging focus is on taking the steps necessary to retain the gains achieved from the major investments of the last forty years.
- The largest aspect of meeting the emerging challenge is that for the first time, in addition to making new investments, repair, renewal and replacement of existing systems is projected to become a large and growing aspect of the managerial and financial requirements.

EPA's agenda

- SRF Plus



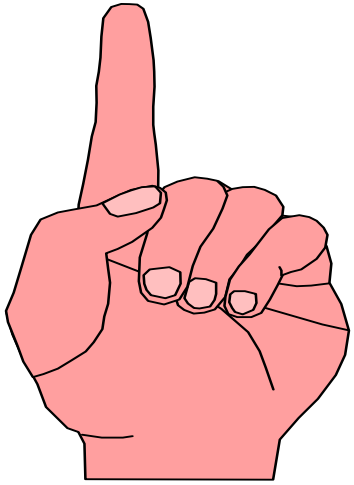
- ✓ Better management
- ✓ Water efficiency
- ✓ Full cost pricing
- ✓ Watershed approach



- **New investments in research**
- **New strategies for education and knowledge mgt.**

The most important consideration in pursuing a sustainable strategy?

That Utilities Are Able to Do Their Work Expertly On Into The Future



Preconditions for a utility to gain community support for a sustainable pathway

- Customers need to understand what a utility does!
- They need to believe that it has value!
- They need to be able to accept as true that the way the work is done (The Practices) are competent, if not exceptional!

The Need To Be Good

The Need To Be Transparent.

A paradigm shift…

- Transition from *building and operating* to *managing* assets
  - Extending asset life
  - Optimizing maintenance and renewal
  - Developing accurate long-term funding strategies

- *Sustain long term performance!*

Bottom Line: Emergent Industry Profile

- Increasing aggregate demand – water and wastewater
- Diminishing available water resources
- Leveling of "production efficiencies"
- Increasing output restrictions
- Aging infrastructure
- ***Result: Increasingly expensive treatment options***

- Aging customer base – more and more on fixed income
- Diminishing technical labor pool running larger and more sophisticated plants and facilities
- Outflow of knowledge with retiring labor base
- Increasing resistance to rate increases
- ***Result: Increasingly complex management environment***

Managing service is about becoming expert at....

Acquisition

Maintenance

Repair

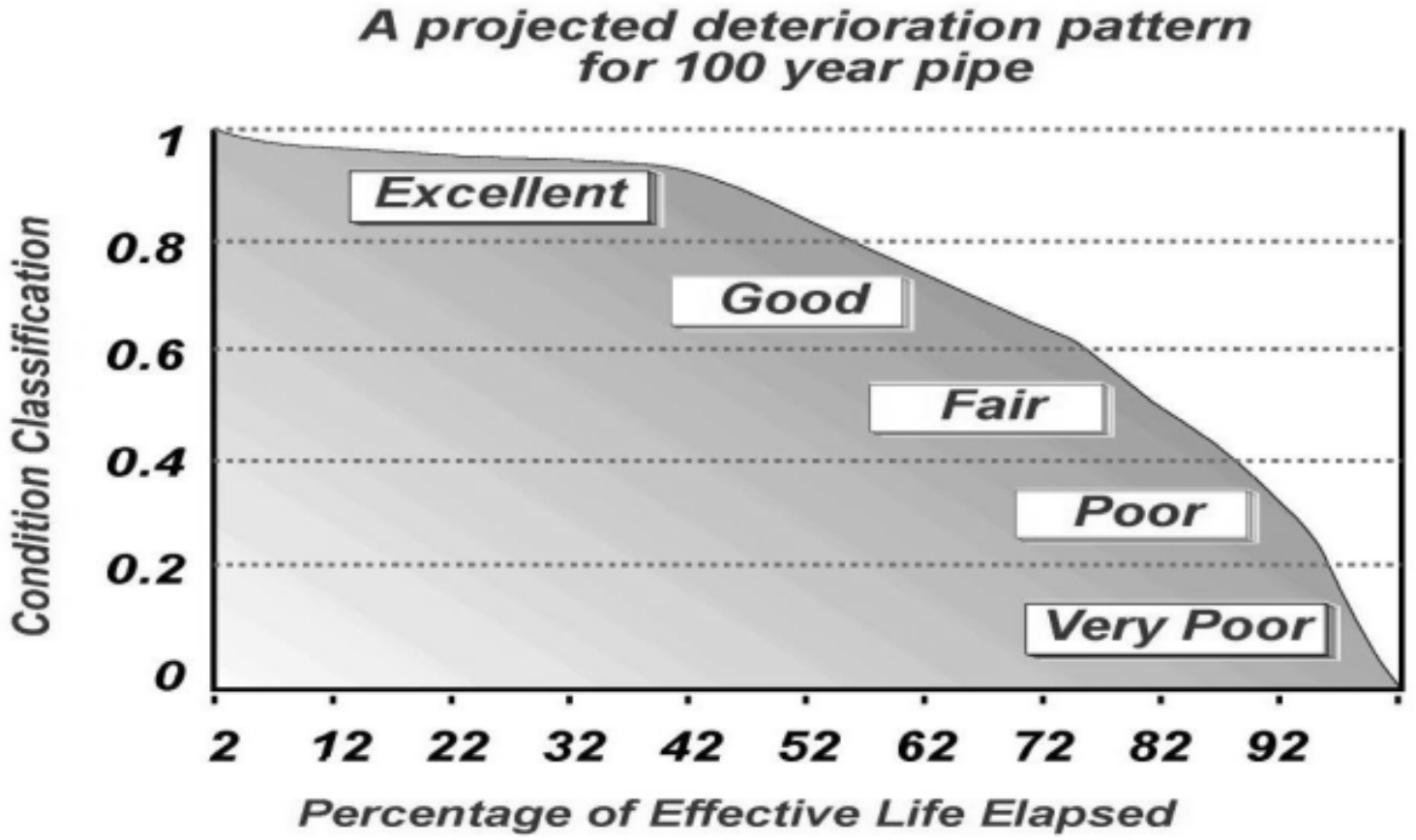
Renewal

Replacement

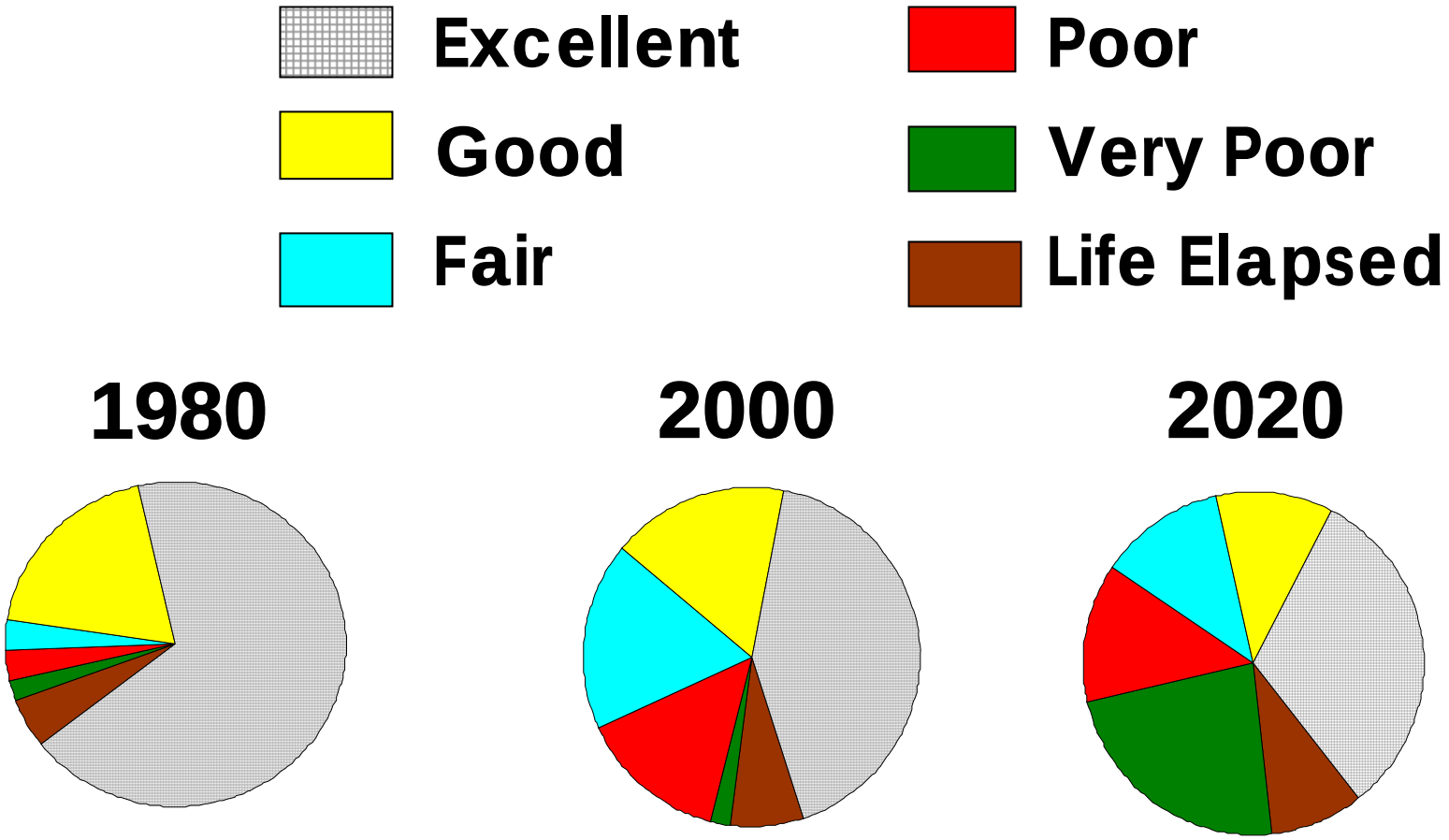
Decision Making

There Are Some Critical Understandings

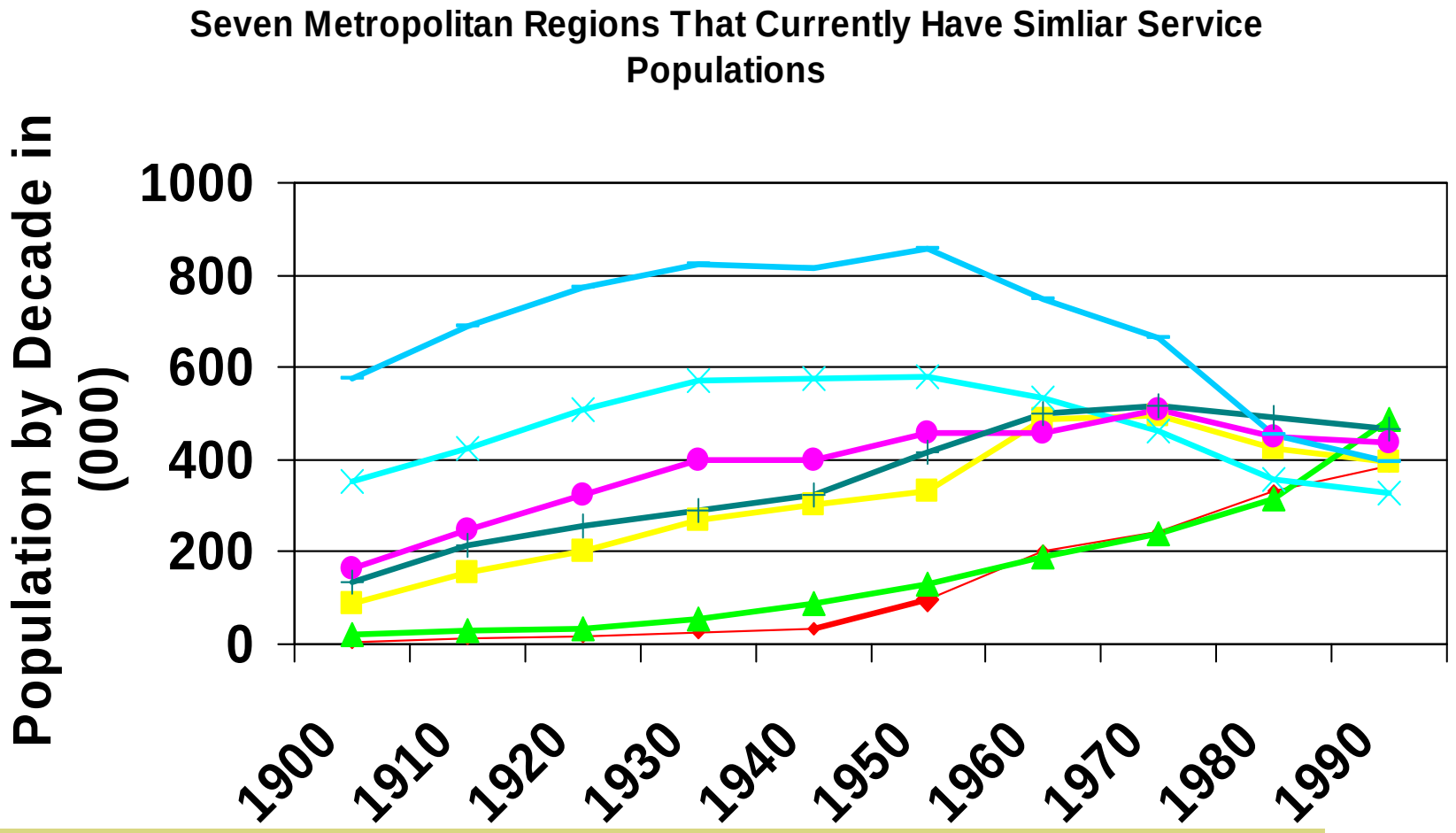
Some asset deteriorate quickly, others over generations



More pipe in lower condition levels will impact costs and performance

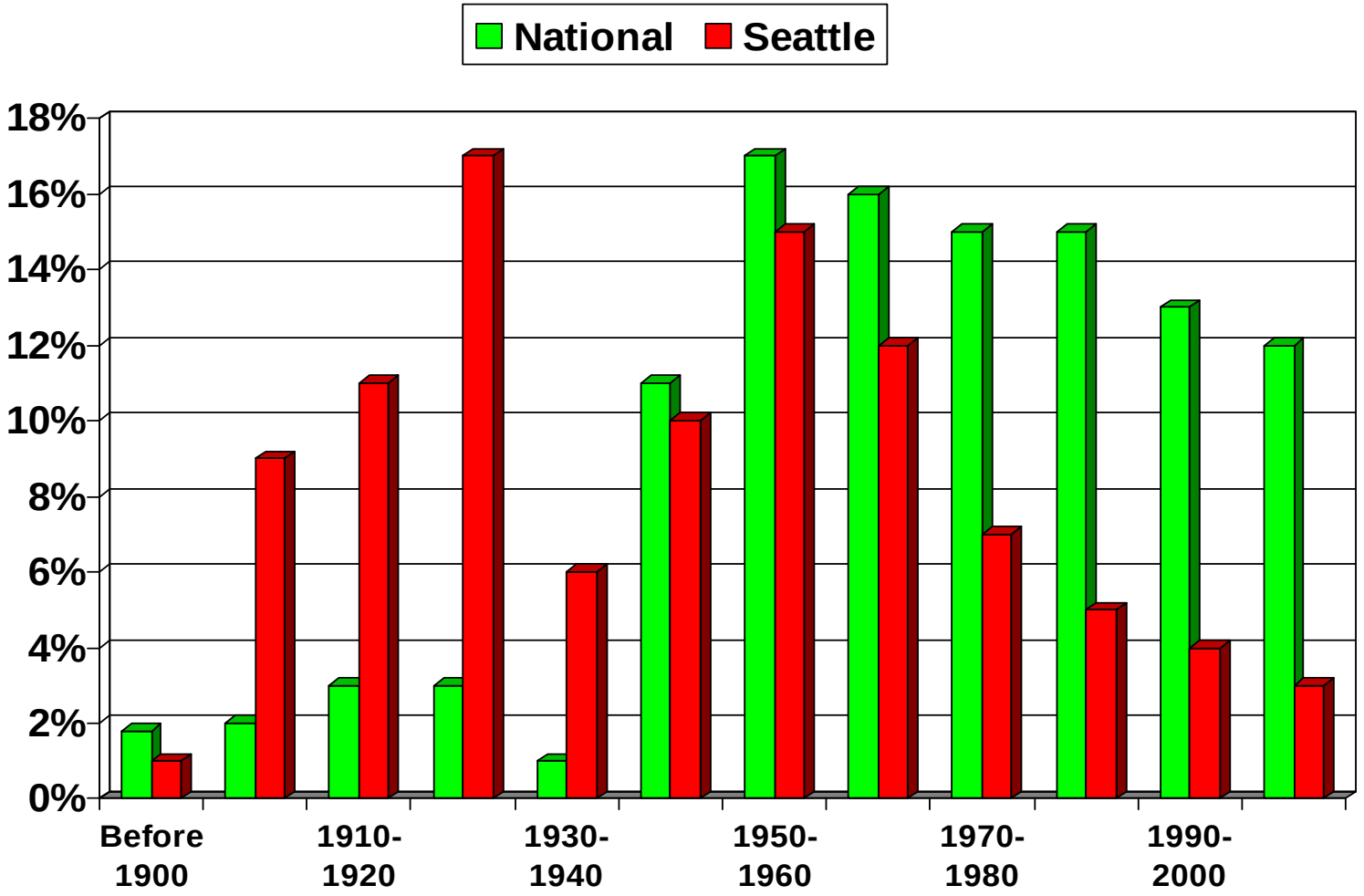


A particular situation is a reflection of the demographic patterns of the specific region.



What services costs in Prosperville, may not provide valuable insight into the costs of services in Bommertown. Specific knowledge is required.

A particular situation is a reflection of the demographic patterns of the specific region.

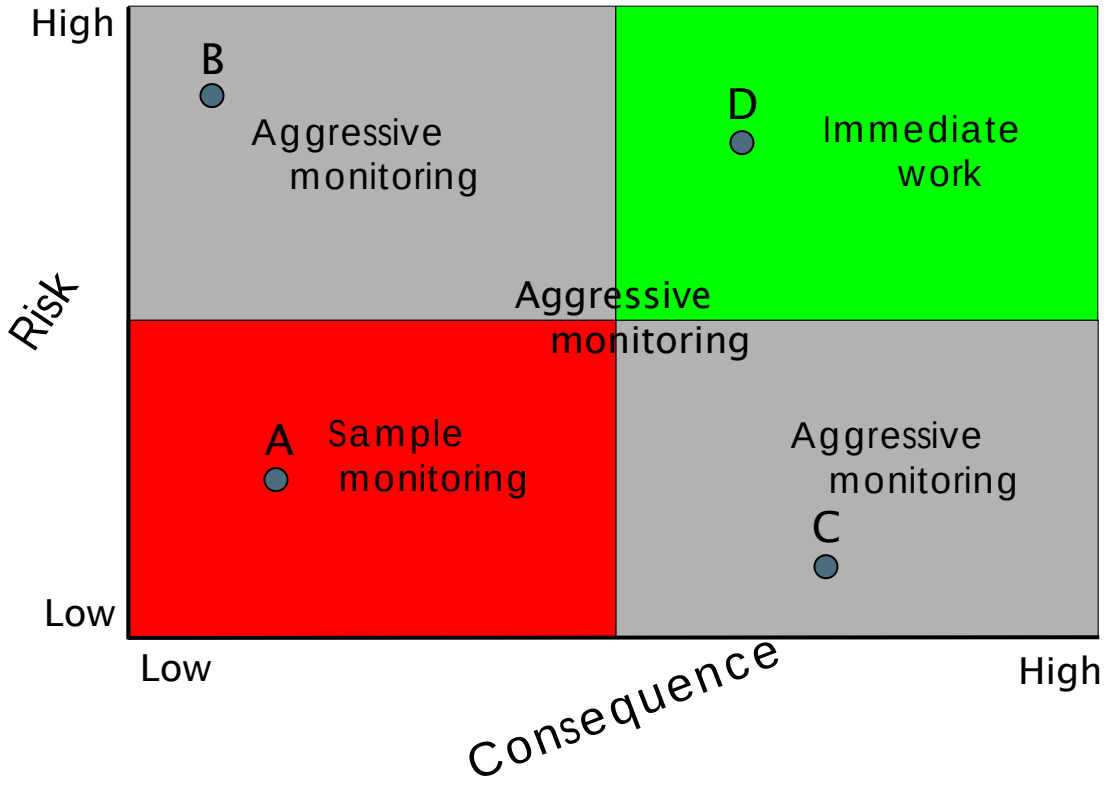


All assets are not created equal!

- **(**Criticality) is a function of:
  - “Consequence” &
  - “Likelihood” of Failure

Business risk exposure drives work program

Work program response



Condition assessment

- Condition assessment is not an end in itself, but is a *means* to an end
- The *end* is to determine *remaining useful life*
- *Good-Fair-Poor*-type ratings have little utility *unless* they lead to an effective estimate of remaining useful life

The remaining useful life of an asset is *what we have left to try to manage*

Respect the value of quality information!

Best Appropriate Process + **Quality of Data Used** = **Confidence That the Course Is the Right One!**

Capital, Operations, Maintenance, Repair, Renewal, Replacement

It’s all investment!

The intersection between global and local perspectives – **Knowledge & Collaboration**

Optimal Investment

&

Optimal approaches

How Does Asset Management Relate To Sustainability?

It's A Critical Building Block

- Better acquisition, operations, maintenance, and renewal and replacement DECISIONS makes a sustainable strategy more manageable.
- A focus on the "How to" aspects of making better choices helps achieve service objectives at least life cycle costs.

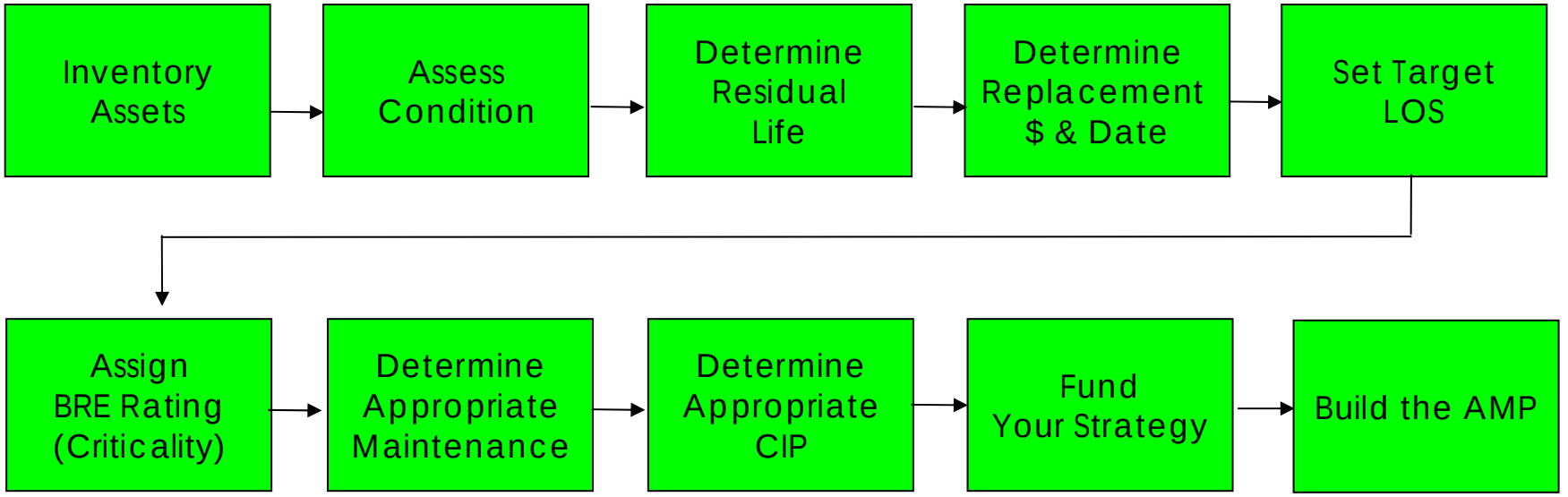
Asset Management Core Questions?

1. What Is The Current State Of My Assets?
2. What Is My Required "Sustainable" Level Of Service?
3. Which Assets Are Critical To Sustained Performance Core
4. What Are My Minimum "Life-cycle-cost" CIP and O&M Strategies?
5. Given The Above, What Is My Best Long-term Funding Strategy?

Problem Solving Is Accomplished By Understanding With Greater Detail The Core Questions

- What is the current state of my assets?
  - What do I own?
  - Where is it?
  - What condition is it in?
  - What is its remaining useful life?
  - What is its economic value?
- What is my required sustained Level Of Service?
  - What is the demand for my services by my stakeholders?
  - What do regulators require?
  - What is my actual performance?
- Which assets are critical to sustained performance?
  - How does it fail? How can it fail?
  - What is the likelihood of failure?
  - What does it cost to repair?
  - What are the consequences of failure?
- What are the best “life-cycle-cost” CIP and O&M strategies?
- Given the above, what is the best long-term funding strategy?

An Advanced Asset Management Program Process

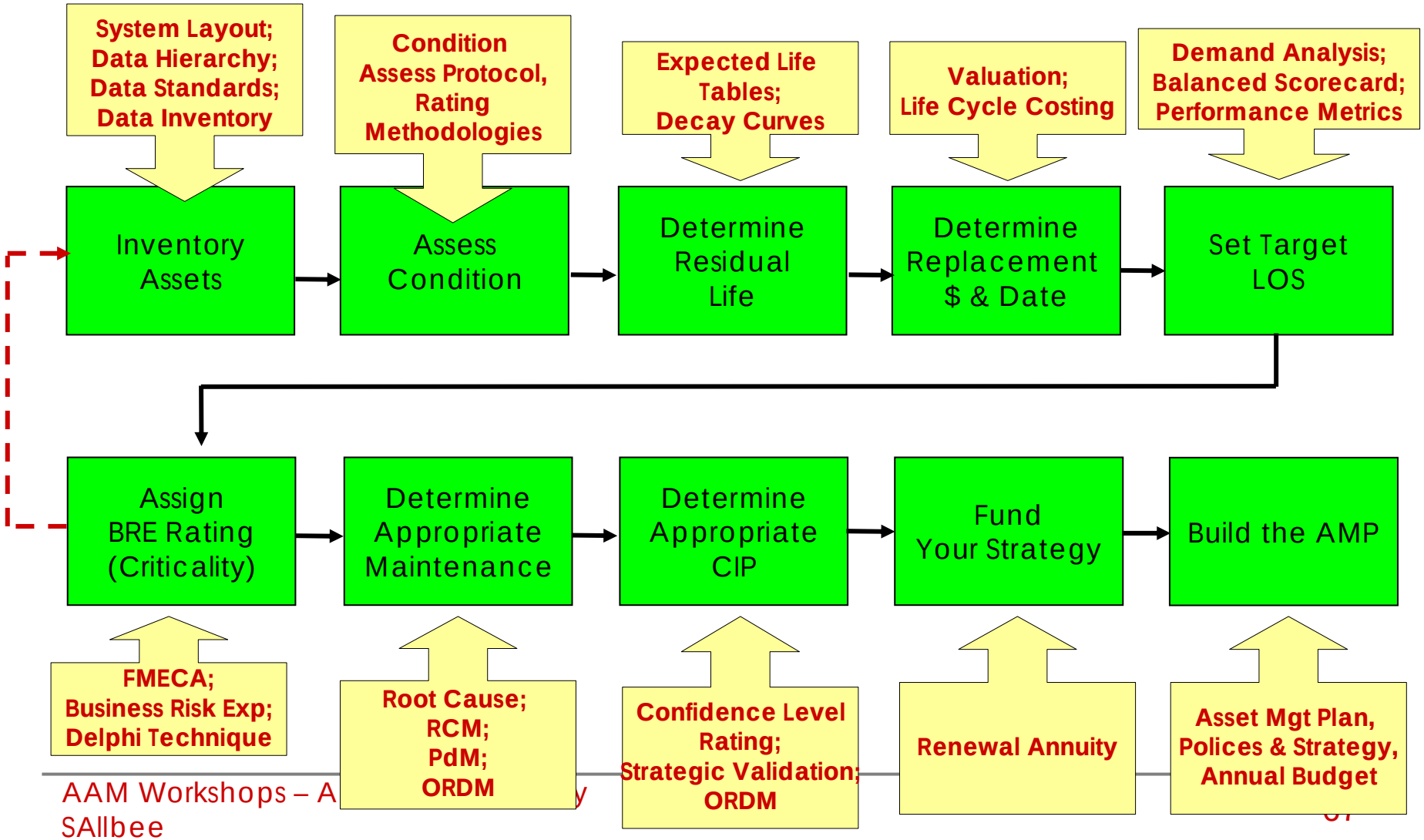


The Common Framework

The IIMM Process

30 Versions Of the Same Thing

The thinking process is important. The "How To" is the yellow boxes



This is a period of rather rapid change fostered by changes in information technology and awareness

- The extent of the investment in new tools and techniques.
- The impact of X-box influenced generation on the water sector.
- The new neighborhood is Global.

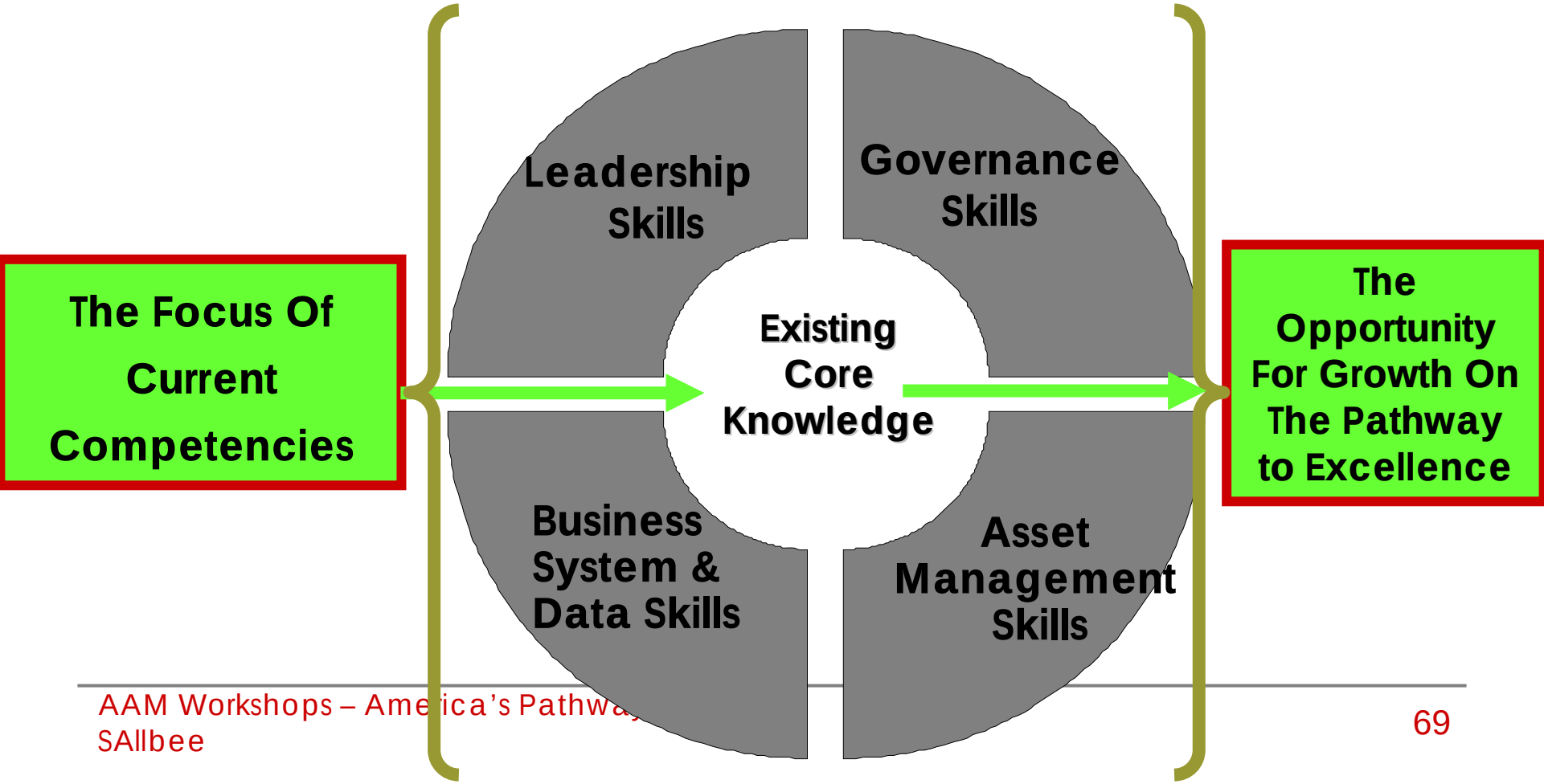
  (Las Vegas / SINTEF partnership example)
- To much critical information is copyrighted or password

  protected (The buy-in to sharing is critical –Wikipedia plus)

The knowledge that interest you
is out there!

The challenge is locating it!

Additional skills will be added to become a sustainable business



Up and coming Key Words

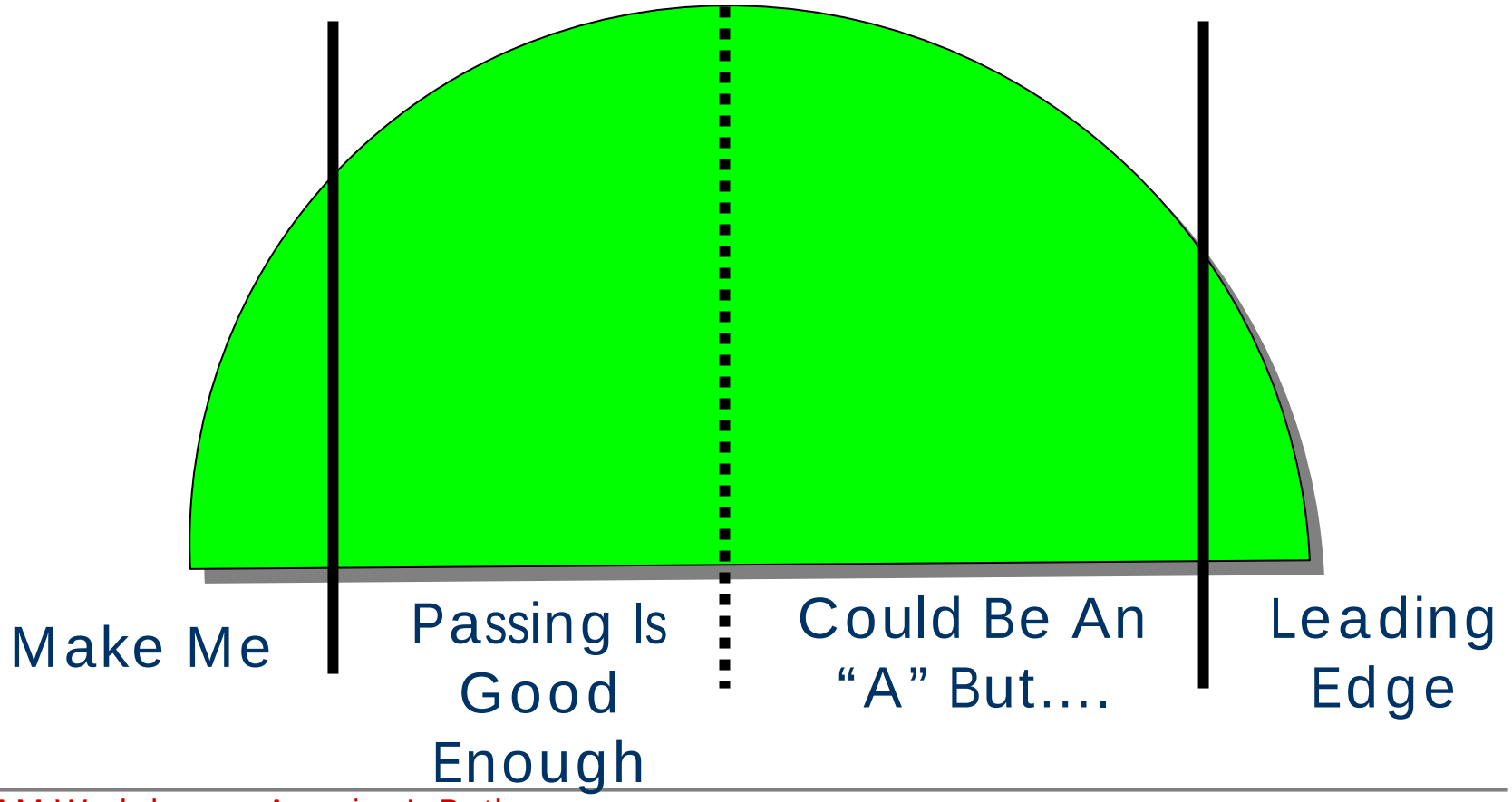
Current:

- Sustainability
- Least life cycle cost.
- Risk management
- Optimal investment
- Condition / Useful life
- Stewardship
- Business like
- Strategic
- Tactical
- Investment

Future: Add the following

- Precautionary principle
- Value
- Intergenerational equity
- Reducing the footprint.
- Carbon management.
- Infrastructure adaptation.
- Green
- UID / RFID
- Whole of Government

Attitude is a big deal in establishing a sustainable situation



It is not just about utilities: Six strategic Impediments – opportunities on the pathway toward sustainability

- Intergovernmental relationships.
- Knowledgeable valuation and pricing.
- Restructuring institutional arrangements.
- Understanding affordability.
- The approaches to setting service levels.
- A strategic and tactical commitment to engaging in an aggressive international collaboration on a water sustainability.

Thank you for your time!

Have a great day.

When you get a chance check out the following

Websites & Video

http://www.epa.gov/owm/assetmanage/index.htm

https://courses.worldcampus.psu.edu/public/buried_assets/

http://www.epa.gov/waterinfrastructure/lgac_video/index.html

http://liquidassets.psu.edu/